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A New Plan for Administering The Patents of Government Employees

ANOTHER attempt is to be made at this session of Congress to enact legislation providing for the disposition and administration of the patented inventions and discoveries of government employees. The Interdepartmental Patents Board appointed by President Harding on Aug. 9, 1922, has submitted a report recommending two bills for enactment by Congress. The full report and proposed bills are published elsewhere in this issue.

This revival of a matter that was the subject of controversy between industry and the government in 1920 is now brought prominently to the attention of industry so that it will be fully advised of the government's proposals in time to appear before Congressional committees when hearings are announced. Two bills, S. 2387 and S. 2388, have been introduced in the Senate and referred to the Committee on Patents. They are identical with the bills proposed by the board and published in connection with the report. Those who are interested should keep in touch with the Senate Committee on Patents.

In 1920 a proposal was made to authorize the Federal Trade Commission to accept assignments and administer the patents of government employees, and to license their use in industry. This proposal met with a veritable storm of disapproval, expressed largely at a public meeting held in the Chemists' Club, New York, Oct. 15, 1920. A full report of the speeches and discussions on that occasion, together with editorial comment, was published in *Chem. & Met.*, Oct. 27, 1920. At that time bills had been introduced in the House and Senate and the one in the latter had been passed. Hearings had been held, but owing to the fact that the announcement had not received due publicity no industrial representatives appeared and the witnesses were wholly from the ranks of government employees.

The present report clarifies some of the clouded issues in the controversy of 1920, but there is still objection to the plan embodied in the bill now in the Senate committee. Based on the fact that "in the absence of a contract providing otherwise any patent taken out by a government employee and any invention developed while in the service of the government is the sole property of the employee to do with as he may see fit," the bill proposes to make it a part of the terms of future government employment

> . . . that any patent application hereafter made or patent granted appertaining to any invention discovered or developed during the period of his government employment and incident to the line of his official duties which in the judgment of the said board should in the interest of the national defence, or otherwise in the public interest, be controlled by the government, shall upon demand by said board be assigned by said employee to the government.

Our objection to this proposal is that the question of assignment or non-assignment by the employees should not rest in "the judgment of the said board," but should be mandatory in every instance. This objection is made on the ground that patented inventions and discoveries of government employees made in the line of their official duties and developed in government laboratories at public expense should in no case be the personal property of the employee. Further, nothing short of omniscience on the part of the board could prevent confusion and dissatisfaction in demanding assignment of some patents and releasing others. Considering the rapid change in industrial conditions, it is difficult to see how the board can determine at any given time what patents may subsequently develop in the public interest. Is the board to change its mind as conditions change and demand assignment when a patent gives promise of becoming useful and profitable? The very possibility points to the necessity of immediate assignment of any and all such patents when granted, without depending upon the judgment of the board or waiting for its demand.

It must be recognized that the government has a problem in the administration of patents now owned by the United States, some of which might properly be licensed for industrial use. It also has a problem in the disposition of patents arising from the official work of its employees. But in our judgment the latter must be met squarely on the premise that the employee should have no personal right in his patent. This being true, satisfactory provision should be made for the commercial use of such patents, and the practice in this respect should be uniform throughout the government departments. Satisfactory administration and licensing form another problem, with its own peculiar difficulties and obstacles. In all probability non-exclusive licenses offer the best method of commercializing the inventions despite the general impression that such licenses would not be taken by individuals, firms or corporations unless they carried with them the monopoly granted in the patent. Since the war industry has had some experience in taking non-exclusive licenses from the Chemical Foundation and has not found the plan as objectionable as it seems on its face. Certainly it would avoid charges of favoritism that would inevitably arise if the board should be forced to grant exclusive licenses.

We have not considered it necessary to review the objections raised in the controversy of 1920, though some of them are still pertinent. We have particularly in mind the danger of government encroachment on private business, and the effect on the employee of any form of reward other than logical promotion or preferment. We believe also as stated several years ago that the government should realize that industry is one of the parties at interest and that no plan will be fair or equitable that does not give due consideration to its effect on industry.

Rôle of the Chemist In Modern Industry

A CONTEMPORARY in South Africa publishes a letter drawing attention to the fallacy of embarking on an industrial venture without adequate technical advice. A case in point was cited. With the idea, apparently, that all coals are alike, a company ordered and erected a complete and expensive plant for the recovery of distillation products. Utter failure was the result. The plant is now lying idle, acting as a deterrent to incentive along similar lines elsewhere. And the cause? Lack of technical advice in the first place; neglect on the part of the company officials to take elementary precautions against failure by the provision of sufficient funds for research, and an inadequate grasp of the fact that successful outcome in technical industries connotes adequate recognition of the importance of the chemist as the pioneer prospector, whose work should always precede the application of capital on a large scale.

The *South African Journal of Industries* deplores the fact that the industrial chemist has not yet come into his own and that his status as an essential cog in the wheel of industry has not been recognized. Industry needs the guiding hand of the technician, especially in the early stages of development and decision. The best insurance against disaster is to place the responsibility squarely on the shoulders of one who is accustomed and capable, experienced and expert. Such men are available, although our South African contemporary avers that the demand is far greater than the supply. Adequate provision in this respect is especially needed in sparsely populated countries and districts, where no precedent, based on successful local practice, can be followed.

Sometimes Government Defeats Its Own Ends

ONE of the emergency measures proposed by the Interstate Commerce Commission in an attempt to supply coal to the public in times of strike or car shortage from other cause is that known as the Order of June 13, 1923. By the terms of this order, the commission is empowered to seize, and assign as it sees fit, the privately owned cars of coal-consuming corporations. It is evidently supposed that in doing this the public interest will be served by providing more cars for transporting coal to the public market; and that the corporations thus deprived of their usual supply will be those that the country can best afford to leave idle.

A number of the companies that would have been affected by this ruling protested and asked for a rehearing. The petitions were granted and, in consequence, briefs prepared by counsel have been placed before the commission for its consideration *de novo*. One of these briefs is presented jointly by several companies that are large owners of coal cars. All these corporations are engaged in supplying gas to distributing companies that sell it for domestic fuel purposes, and they rightly make the plea that their business is one in which the public welfare is concerned; and that any interruption therein will be the cause of much hardship among those dependent upon them for light and heat.

In reading over this brief and in considering the commission ruling in the light of it, the thought occurs that often government action is almost sure to defeat the end it seeks. Consider this particular case. The corporations that filed the brief in question are the owners of coal cars solely because they wish to be assured of a coal supply at all times so that they may fulfill their contracts with the companies that distribute gas to the public. If the Interstate Commerce Commission rules that in case of so-called emergency these cars may be seized for the purpose of carrying coal to the public, then the owners of the cars are assured that, in the event of the emergency for which they purchased the cars, they will not be allowed to use them. Is it likely that they will long continue such ownership in the face of such a ruling? It does seem as if our public officials were sometimes lacking in that astuteness which is so characteristic of the corporations that are affected by their actions.

Word Coiners, Get Busy

WE HAVE always had a warm spot in our heart for the philologist. Words are tools in the editorial business—in what business are they not?—and there is a fascinating science in using them correctly. But like all other tools they have their shortcomings, and consciously or unconsciously we resent the limitations they sometimes place upon us.

Particularly unsatisfactory are some of the bunglesome generic terms that have come to be attached to the products of certain of our chemical engineering industries. There is always the temptation to call these products by their familiar trade names, but the staid old rules of the style book as well as the dictums of editorial ethics usually compel us to do otherwise. Bakelite products must be synthetic phenolic resins, Celluloid becomes a pyroxylin plastic, Crisco a hydrogenated cottonseed oil, Fabrikoid a pyroxylin-coated fabric, and Aspirin the mono-acetic ester of salicylic acid. And of course there are scores of other examples equally incongruous.

In addition there is an important group of deserving chemical products that have always been handicapped by the distasteful epithets "artificial" and "substitute." Such products of modern technology as artificial silk, the lard substitute and artificial leather have their own characteristic spheres of usefulness quite apart from those of the materials for which they were named. To make an automobile top of leather is not exactly a physical impossibility, but the pyroxylin or rubber coated fabric will accomplish the result better and more economically. The housewife prefers the hydrogenated oil for deep-fat frying because it gives less of the disagreeable smoke and odor of burning lard. And yet the common generic name for the superior product is lard *substitute*.

Not long ago that eloquent scientist Dr. Slosson spoke to a chemical audience about our unscientific use of generic terms. He told how the man who first used the transparent gelatine from the sturgeon called it glass. Later it was replaced by thin sheets of the mineral mica, but the name isinglass persisted. More recently a pyroxylin product has largely replaced both materials, and yet in the trade it is bought and sold as mica. Thus it will be seen that language in its own development is a slow and unsatisfactory process.

Now we are witnessing some attempts to catalyze the process. The dry goods trades interested in artificial silk have registered their protest against the stigma

of a term implying that their product is a substitute and therefore inferior to real silk. They have agreed to abandon the old name entirely and hereafter the newer cellulose product is to be known as "glos." The *Cotton Oil Press* apparently believes this is a step in the right direction, for in its February issue it has inaugurated a competition in the hope of establishing a new generic name for the lard substitutes.

There is room in the chemical engineering industries for many other competitions of like character. The creative philologist will find here a fertile field for word coinage and if he succeeds, even as well as did the dry goods merchants, he will have contributed a lasting service to our industries. Besides, think how much easier it will make the editor's job.

Wanted: An Explanation

RECENTLY there was briefly described in these columns the Schaap process for annealing cast iron. Its value is already established, but the reason for its efficacy is yet to be discovered. The man that finds the explanation will be a real contributor to metallurgical progress.

Last Tuesday evening Prof. Bradley Stoughton, appearing before the New York Chapter of the American Society for Steel Treating, described this process and showed the remarkable results obtainable with it. His able presentation provoked a general discussion. Visiting metallurgists here to attend the A.I.M.E. convention contributed to the discussion of the remarkable results of the process, yet the desired enlightenment regarding its mechanism was not forthcoming. The fact that the cast iron must be protected by a wrought-iron muffle which may be open at the top is taken by some to indicate that the absence of hydrogen is the essential factor. We are inclined to think, however, that there is not yet sufficient evidence to make this theory acceptable. Progress might be made toward the explanation by subjecting the cast iron to the correct temperatures while "protecting it" in other ways, as by keeping it immersed in a liquid—a salt bath, for instance. There seems to be no doubt that the matter surrounding the cast iron influences the results obtained. Why not try many kinds of matter in addition to the products of combination that have already been tried?

Professor Stoughton mentioned that although the Schaap process is patented, "anyone is allowed to use it." This makes experiments possible on an industrial scale. These will probably bring to light the explanation that is sought and may result in even further improvement of the process.

Public Recognition

IT IS encouraging to find the popular press devoting more space to matters pertaining to the activities of chemists and chemical engineers. In a recent Sunday edition of the newspaper with the slogan "All the news that's fit to print," the New York *Times*, we were pleased to find the equivalent of almost a page devoted to chemical subjects. Seven articles averaging a column in length were interspersed throughout the issue, sharing equal prominence with the leading news of the day.

Sound publicity is greatly to be desired in establishing an improved status for the chemical profession. Lack of popular appreciation of the function of the chemist and the chemical engineer has had much to do with the unfortunate attitude the public has long maintained. Our English cousin's popular conception of the chemist has confused many who should have an adequate and reliable idea of what such men actually are and what they accomplish. And we know too well that the chemical engineer to many a layman has been a cross between a plumber and a druggist.

To obviate such a state of affairs, no single factor is more potent than the daily press. Hence when the *Times* finds it fitting to print items running the gamut from nitrogen fixation through the origin of petroleum, and the Bohr theory of atomic structure, to a discussion of eminent American chemists and to the development of new foods and medicines, it is decidedly clear that an awakening influence is at work. The issue cited is not taken to be unusual for this or for certain other of our most progressive newspapers. A tendency to print more and more such news is manifest. It is a healthy sign.

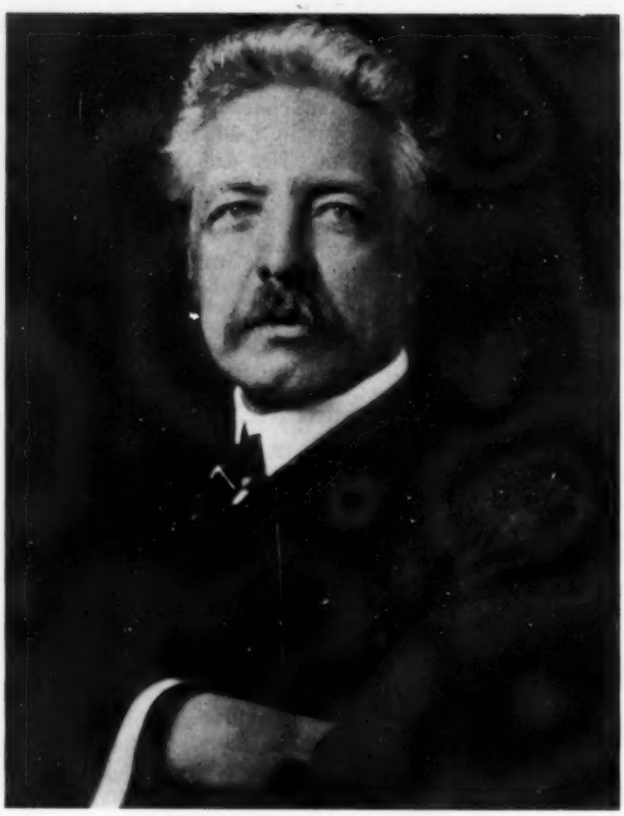
How Accurate Are The Statistics?

THERE are always some people who will look at a six and call it a nine no matter which way the loop turns. Likewise there are some individuals in the chemical industry who never pick up a government publication without expounding on the inaccuracy of every figure in it. There is seldom any definite basis for their criticism. Either their exaggerated stories have been repeated so often that they actually believe them or, as is sometimes the case, their wholesale condemnation hides an individual grudge or grievance.

The latter seems to have been the case with the argumentative salesman who recently discoursed to us on this subject. He was sure that his firm alone produced twice as much of a certain chemical product as was shown in a recognized government publication. We were just enough interested to investigate the matter a little further. We found what we had expected to find—namely, that the government figures were based on written reports received from all of the producers. We were told that the report of the particular firm in question had been signed by the president of the company and witnessed by a notary. In passing this embarrassing information on to our bellicose salesman we included this paragraph from the letter of the government official to whom we had turned for assistance:

> Your comment as to accepting oral information from interested parties is borne out by similar experiences of members of this organization. I have more than once been surprised that even the producers themselves should estimate so far from the truth when the commodities in question were made by only a few establishments. Oral information is surprisingly inaccurate. Statistics of government bureaus are as accurate as the individual written reports of the producers, and no effort is spared to have such individual reports revised by the producer when there is any question as to accuracy.

It is obvious, of course, that minor discrepancies will occasionally enter into any statistical compilation. It has been our experience with the government departments, however, that they are often the first to recognize mistakes and they always go to considerable pains to have them corrected. Instead of throttling the statistical work of these agencies with ill-advised, destructive criticism, industry can well afford to encourage the effort by helpful co-operation. After all, the criticism of inaccuracy is a reflection on the integrity of industry itself.



Albert Sauveur

Bessemer Medalist for 1924

Born Louvain, Belgium, June 21, 1863. Professor of Metallurgy, Harvard University. Formerly Editor of "The Metallographist" and of the "Iron and Steel Magazine." Author of "The Metallography of Iron and Steel." Awarded Cresson Medal of Franklin Institute, 1913. Fellow of the American Academy of Arts and Sciences. Honorary member of Society of Steel Treaters. Sc.D., Case School of Applied Science. Chevalier of the Legion of Honor.

IT IS appropriate that the American Institute of Mining and Metallurgical Engineers should have established a memorial in the form of a lecture to Henry Marion Howe. It is appropriate too that it should have chosen Albert Sauveur to give the first lecture. Not only did his long and friendly association with Howe make him a happy choice but his unique distinction as a metallurgist would have made the occasion memorable in itself. And finally the fates contrived to add further distinction to the occasion, for on the same day the Iron and Steel Institute of Great Britain announced the award of the Bessemer medal for 1924 to Professor Sauveur, "in recognition of his eminent services in the advancement of the science of the metallurgy of iron and steel."

In his discourse Professor Sauveur analyzed the outstanding characteristics that made Howe great and notable. Inquisitive, a tireless worker and a careful thinker, he had dared to study and discuss fundamental questions. At 27 Howe presented a paper to *Engineering & Mining Journal* entitled "What Is Steel?" Designedly Professor Sauveur had chosen the same subject to indicate that the work of today was still following the lines laid down by Howe years before.

Again, he emphasized Howe's wholesome conservatism toward new theories and his unwillingness to be stampeded into conclusions. It was a conservatism that was never critical, but sane and balanced. The tendency of the scientific worker is always to see new developments in terms of set theories and hobbies, and this never makes for an honest weighing of progress.

It is our privilege to indorse the standards laid down by Professor Sauveur and to apply them with pardonable liberty to their author. With complete unconsciousness he has given us a gage by which we find him also great. Then let us add other standards — industrial prestige and academic honor, constructive thought and work—and by these other standards we do but confirm our conviction.

Albert Sauveur was born in Louvain, a name since branded indelibly on our consciousness. His education at Liége and subsequently at Massachusetts Institute of Technology fitted him for 9 years of industrial experience, from which he returned to Harvard in 1898. There he has remained as professor of metallurgy and has made for himself and for Harvard an enviable name in the metallurgical world. In the early years of this century he was editor of the *Iron & Steel Magazine* and relinquished his editorial duties when the magazine was combined to form what has since become *Chemical & Metallurgical Engineering*.

It is a pleasure to pay our sincere respects therefore to a colleague in editorial work, to a brilliant metallurgist, to a Chevalier of the Legion of Honor and to a man whose kindliness has stimulated many students and colleagues to great achievements.

Typical Latin-American Forest, Paraguay

Latin America as a Source of Tanning Materials

The Increasing Importance of Vegetable Tanning Materials of Foreign Origin Makes the Immense Resources of Nearby Latin America of Unusual Interest

By Otto Wilson

Former Chief, Latin-American Division, Department of Commerce

Until 25 or 30 years ago, interest in any review of foreign sources of tanning materials on the part of American tanners would have been slight. Hemlock and oak trees yielded the bark that furnished the only vegetable tannage used, and forests of these trees stretched away over wide areas, promising plentiful supplies for an indefinite period. The tannin from these barks could be used without any other agent for producing both heavy and light leathers, and so high was the quality of the product that an extensive export trade was built up in American leather, especially sole leather, made by the use of these materials. Then the hemlock trees became more and more scarce, and tanners suddenly realized that the accessible Eastern forests were fast fading away before the ax of the woodsman. At the same time the supply of oak bark near the localities where tanneries could be conveniently set up became smaller and smaller and the tanners had to go farther and farther afield for it.

The result was a turning to other tanning agents than those which had formed the basis of the industry for a century. The vacuum pan process of concentrating liquid extracts was invented, making practicable the use of raw materials with lower tannin content than oak and hemlock bark, particularly chestnut wood. Foreign countries began to send on products from their forests and factories, obtained at low cost because of the cheapness of labor and the ability of technical assistants. Tanners experimented with blends and mixtures instead of relying wholly on one agent as before.

In the last quarter of a century the tanning industry may be said to have shifted to a new basis, so far as tannins are concerned, and now the use of foreign materials, while still considerably less than that of domestic, has reached the point where they may become the chief reliance of American tanners.

This development has led the government to make a comprehensive survey of the whole present situation with regard to tanning materials, especially with a view to ascertaining what our position will be in future contingencies. For several months the Department of Commerce, working with the Tanners' Council, has been gathering data and the results of its researches have appeared recently in a pamphlet that summarizes the whole situation with regard to domestic and foreign supplies. ("The Problem of Our Commercial Independence in Tanning Materials," issued as a trade information bulletin by the Bureau of Foreign and Domestic Commerce, Washington.) From this survey it appears that there is no present danger arising out of our growing use of foreign tannages. The wide forests of the Northwest contain immense supplies of hemlock and related woods, which are left untouched because the expense of exploitation is much greater than the

cost of imported materials, and this is true also of other domestic resources such as oak, sumac and canaigre. In case of pressing necessity we could rely on these reserves and the domestic raw materials now being used, to furnish us with our full needs for producing leather. But this is true only of the present and the near future. Looking many years ahead the situation is less reassuring.

Blight Destroying Chestnut Forests

Our biggest domestic source of vegetable tannin, making up almost half of the total amount of domestic products consumed in 1922, is chestnut extract. Chestnut forests are found chiefly in the Appalachian highlands, the center of the general area lying in western Virginia and North Carolina, eastern Tennessee and the northern part of Georgia. North of Virginia, according to the Department of Commerce, the chestnut blight has killed off 80 per cent of the available chestnut, and unless some effective way is found for stopping it the blight will undoubtedly attack the rest of the chestnut area in the same manner. Quoting the pamphlet mentioned:

"It would appear to be of the greatest importance to the future of the leather industry of the United States to take immediate steps to study the chestnut blight with a view to inaugurating such action as may be determined upon to arrest the progress of the disease or to prevent its ravages from completely exhausting this valuable natural resource. A national policy looking to the conservation, production and development of chestnut wood therefore appears to be a matter of prime importance."

If this blight is not checked, we are probably due for another shift in the basis of the tannin industry, and the department believes that the new source called upon will be a plant now foreign to our soil but capable of being extensively cultivated here. If the chestnut blight is not sufficiently arrested, it says, wattle bark will become the most important vegetable tanning material in this country within the next 20 years.

Our Dependence Upon Foreign Tanning Materials

Before considering what Latin America has to offer in the way of tanning materials it may be of interest to quote some of the figures compiled by the Department of Commerce showing the extent of our present dependence on foreign supplies. Inasmuch as two kinds of tannages are considered—tanning extracts and the raw materials such as barks—it was found convenient to adopt a unit of measurement to which both could be reduced. This is the "bark ton," based on 12 per cent tannin. The department finds that in 1922 the total consumption of tanning materials, both barks and extracts, amounted to 1,185,091 bark tons, of which 469,183 tons was imported. Domestic extracts used amounted to 382,322 bark tons and foreign extracts to 350,517 tons. Domestic and foreign tanning materials of all kinds, both raw and in extract form, used in 1922 were as shown in Table I.

Table I—Tanning Materials Used in United States During 1922

Domestic	Tons of 2,000 lb.	Bark Tons	*Foreign*	Tons of 2,000 lb.	Bark Tons
Extracts:			Extracts:		
Liquid chestnut	118,960	247,833	Liquid quebracho	37,508	109,398
Powdered chestnut	18,665	93,325	Solid quebracho	43,610	236,221
Liquid hemlock	3,404	7,092	Wattle bark	725	3,625
Powdered hemlock	393	1,801	Myrobalans	79	329
Liquid oak bark	9,134	19,029	Valonia	58	290
Powdered spruce	102	468	Mangrove bark	16	73
Liquid spruce	5,368	11,183	Sumac	268	581
Liquid blended	86	179			
Powdered blended	308	1,412	Total	82,264	350,517
Total	156,420	382,322	Raw materials:		
Raw materials:			Mangrove bark	4,039	13,463
Raw oak bark	148,474	148,474	Wattle bark	11,604	33,485
Raw hemlock bark	185,019	185,019	Valonia (cups and beards)	7,553	22,659
Fir bark	101	93	Myrobalans	10,297	25,743
			Divi-divi	3,774	12,580
Total	333,594	333,586	Sumac	4,601	10,736
			Total	41,868	118,666

Latin-American Resources Virtually Untouched

Of the imported articles in this list with which the soil of Latin-American countries would be familiar there are only four—quebracho, mangrove, divi-divi and sumac. But these give hardly more than a hint of the immense resources in tanning materials which these half-explored countries contain. Covered in large part by great wide-spreading and often dense forests, the lands of South and Central America offer a reservoir of materials for the tanning of leather which in variety, number and future possibilities can probably be surpassed nowhere else in the world. With one exception they have not yet entered conspicuously into the world's commerce. The properties of many of them are locally known, since the presence of cattle everywhere has brought about the growth of small-scale tanning throughout all these countries, but their possible usefulness to the big tanneries of Europe and America under present conditions yet remains to be determined. No scientific study of their properties has been made, as the world has been satisfied to continue to use the well-known materials which it can usually get plentifully close at hand, and has not felt the need of ranging into the newer lands for unknown substances. But just as quebracho waited some hundreds of years before its qualities were discovered, so there may be other tannin-bearing plants in the forests of South America which the tanning industry would not want to dispense with, once their value was discovered. In a pamphlet, "Tanning Materials of Latin America," published in 1918 by the Department of Commerce as Special Agents Series 165 of the Bureau of Foreign and Domestic Commerce, Dr. Thomas H. Norton has listed 143 vegetable sources of tannin in Latin America, including barks, woods, leaves, roots and fruits, and has given such details regarding their use and properties as have so far come out of the laboratories and tanning establishments into which they have made a casual entrance. The present review is indebted to this compilation, the only one of its kind published, for many of the facts given regarding these materials.

Aside from quebracho only two products of Latin-American soil find their way into the vats of American tanners, and those two only in small amounts. They are mangrove and divi-divi, both regarded as valuable tanning agents. A brief outline of present status and future prospect of the mangrove industry is given in the following paragraphs, while quebracho and divi-divi will be discussed in subsequent articles.

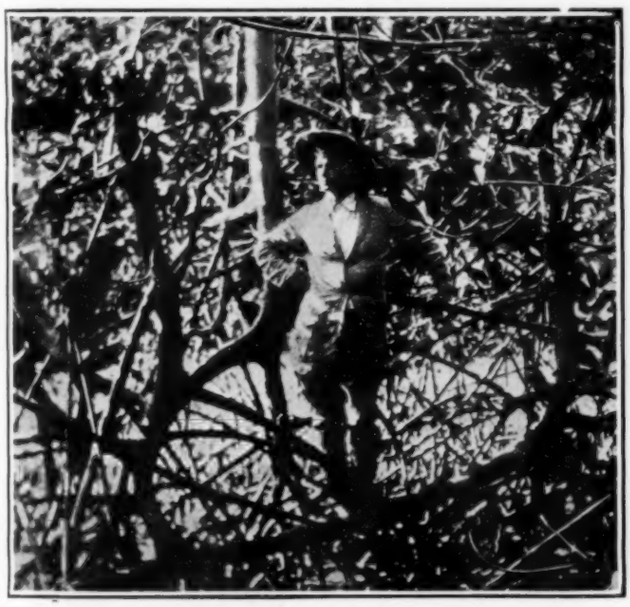
Mangrove Jungles Await Development

Mangrove is common throughout all the tropics, not only of Latin America but of all the rest of the world as well. This tree, with its tangle of long roots reaching high above the water, is a familiar sight along the salt-water coasts of the tropics and along the banks of rivers running down to salt water. (See illustra-

tion.) It grows prolifically along tropical and subtropical coasts, being found as far north as Florida and Texas and as far south as southern Brazil. Since both the bark and the leaves are rich in tannin, these mangrove jungles constitute an immense reservoir of tannin which can always be drawn upon when the need arises. It is one of the cheapest of all tannins and a very extensive future development of the industry of gathering it in northern South America and elsewhere seems certain.

Mangrove Industry Now Local

Mangrove has received more attention in other parts of the world than in Latin America. India and the East Indian islands have developed the gathering and shipping of the bark into a standard industry, the product appearing in commerce as "mangrove cutch," and Portuguese East Africa, Madagascar and Australia have immense supplies which regularly feed the European markets. In the Philippines there is said to be abundant opportunity to develop the industry. In the Americas the use of mangrove has been largely local.



Mangrove Jungle in Honduras

Tanneries in southern Brazil use the leaves exclusively (the leaves will not stand long transportation without deteriorating). Consular reports from Rio de Janeiro, Bahia and Para show that supplies are abundant and in some cases Brazilian firms have been seeking North American buyers of bark. Brazilian bark contains about 36 per cent tannin and the leaves 24 per cent or less. In Ecuador mangrove or "red mangle" logs of great length and large diameter are plentiful, the bark sometimes being as much as an inch thick. A considerable trade with the United States has at times been carried on. Venezuela has also sent many hundreds of tons of bark to this country and can undoubtedly supply very much more if the demand is strong enough.

Colombia has perhaps developed the mangrove industry farther than any other South American country. Along the Sinu River and elsewhere in that country there are almost inexhaustible supplies, and during the war two factories were drawing upon them and making mangrove extract for export. One of these was in Cartagena and the other at Cispata Bay. Each had a reported capacity of about 2,400 tons of extract a year. In one year more than 2,000,000 lb. was sent to the United States, but post-war conditions depressed the market and the extent of present operations is unknown. Mexico has immense amounts of mangrove but has not exploited them for export. A report from the American consul at Acapulco last August said that the construction of a new canal had opened up "almost inexhaustible" supplies of mangrove, of both the white and the brown variety, and that one firm could furnish 50 to 100 tons a month for export.

United States Imports From More Distant Sources

Although the United States has these great reserves of mangrove at its very door it has brought most of the few thousand tons it uses each year from sources much farther away. In 1921, out of a total importation of 2,260 tons of the bark only 409 tons came from this side of the world, of which the Dominican Republic sent 279 tons and Venezuela 60. Most of our supplies came from Portuguese East Africa. In the year before, that colony together with the British possessions in Africa and the Dutch East Indies sent us a large part of the 6,762 tons we purchased, the share of the Dominican Republic being 604 tons, of Haiti 430 tons, and of Venezuela only 17 tons. This 1920 trade was higher than for any other year since the war, although in 1913 we used more than 15,000 tons, of which Germany supplied two-thirds. Apparently American tanners will use mangrove when it is made convenient for them to obtain it, but with many other materials available they will not make a special effort to form new connections and tap new sources. If the producing industry is to be developed in Latin America, it will doubtless be through the formation of a strong organization that can function as a connecting link between producer and user.

How Mangrove Is Used

The chief use of mangrove is for tanning sole and other heavy leathers. Leather tanned with mangrove alone has a dark-red color and is inclined to be brittle, and in use mangrove is nearly always mixed with other agents such as mimosa, chestnut, hemlock and oak.

A detailed account of the effects of tanning with mangrove and wattle bark on different parts of an ox-hide will be found in the *Journal* of the American Leather Chemists Association for May, 1917. The United States Tariff Commission's Tariff Information Survey on "Tanning Materials and Natural Dyes" presents an excellent concise summary of the chief facts relating to mangrove, as well as other tanning materials imported in quantity.

Mangrove extracts, according to this survey, are available on the market in both liquid and solid form, the latter being imported. The tannin content of the solid extract runs about 50 to 55 per cent. It is imported in large blocks usually of a reddish-brown color, although the color as well as the solubility varies with different origins and methods of preparation. It is sold under a number of trade names. Two varieties of the liquid extract are marketed, that made directly from the bark and that made by dissolving the imported solid extract. The liquid is sold on a basis of 25 to 35 per cent tannin.

(Quebracho, divi-divi and other less developed tannin resources of Latin America will be discussed in subsequent articles.)

Interpretation of
Coke Surfaces and Structures

In This Paper the Author of the Recent Article on Formation of Coke Interprets the Meaning of Variations in Coke Appearance as Affecting Coke Utility

By A. Thau
Superintendent Deuben Coke Plant, Halle, Germany

TO SHOW the surfaces of different kinds of coke clearly, a few selected pieces of beehive coke are shown herewith. The fundamental difference between beehive and byproduct oven coke rests in the first place in the size of the lumps, as illustrated in Fig. 1, where a piece of beehive is shown on the left and byproduct on the right. In the beehive oven the coking seams are formed in the horizontal plane, so that the shrinkage cracks run vertically as shown in Fig. 1. Another marked difference between the two kinds of coke is in their surfaces. Those surfaces of the beehive coke that have, by the contraction of the charge, been exposed to great heat and streams of gases at the same time are covered with a beautiful glaze of carbon in the form of graphite. This metallic luster, peculiar to beehive, can be recognized on the large piece of Fig. 1, particularly on the surface of the lower half. Part of this surface is shown in original size in Fig. 2, from which will be noted that there is no porosity whatever in evidence, but the whole of the cell structure is covered and closed with a carbon glaze in the shape of warts.

In byproduct coke this glaze is generally absent. It is a strange fact that this absence of the silvery luster, together with the smaller size of the byproduct coke, formed the base of the great prejudice that seriously hampered the general introduction of the byproduct coke oven some years ago. To overcome this the first chamber ovens were practically of double the width of our modern ovens and with low heats and slow carbonizing large lumps could be obtained.

It was a different thing, however, to get the silvery luster, and all efforts to obtain this surface failed. It was a common belief, and one which is still prevalent in many quarters, that the appearance of the luster is due to the fact that the beehive coke is quenched inside the oven, thus excluding the action of air upon the hot coke surfaces and making oxidization impossible. As a chamber oven could not withstand the action of quenching water for any length of time, efforts were made to quench the coke immediately after leaving the oven and before any oxidizing action of the air could have any possible effect.

The outcome of these efforts in the United States was the introduction of the Moore coke quencher, introduced during 1903 at the Sharon plant at South Sharon, Pa., and at the Cambria plant at Johnstown, Pa. The carbonized charge was transferred in bulk to the quencher, which in size and shape corresponded exactly to an oven chamber. The coke was quenched under the exclusion of air, without, however, obtaining the beehive coke luster. In England the Darby quencher, still extensively in use, was applied for the same purpose. Here the coke was very slowly pushed through a hood of perforated pipes or plates fixed in front of the discharge door of the oven, while water was forced with great pressure through the perforations against the slowly passing charge of coke. In both these cases the coke looked bright enough, but the glossy appearance peculiar to beehive coke was not attained. The fact is that the glossy appearance of the beehive coke has nothing or very little to do with the mode of quenching.

The writer has had the opportunity, in connection with other work, to observe that the decomposition of hydrocarbon gases at high temperature to liberate carbon can be greatly accelerated by an admission of oxygen, which naturally causes a partial combustion of the gases. Whether catalytic action or the increased

Fig. 1—Comparison of Beehive and Byproduct Coke

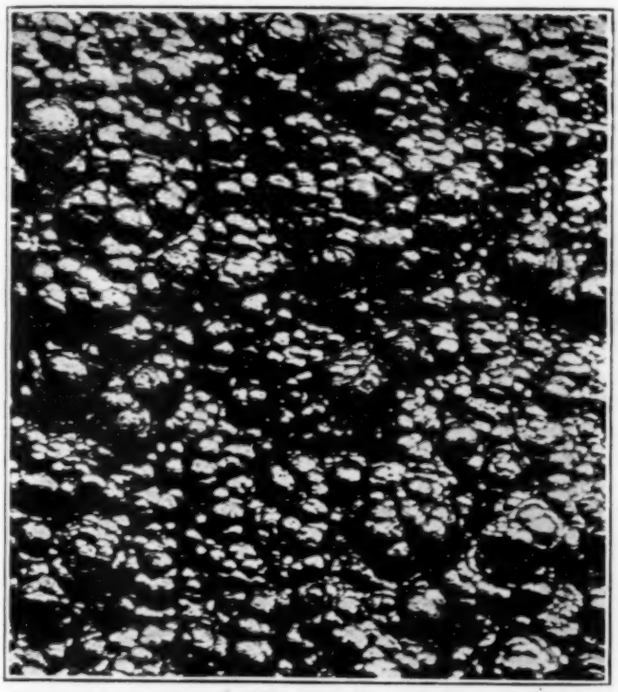


Fig. 2—Glaze of Vitreous Carbon on Surface of Beehive Coke

Fig. 3—Beehive Coke Surface
Showing growths of vitreous carbon.

Typical Examples of Vitreous Carbon Deposits on Beehive and Byproduct Coke

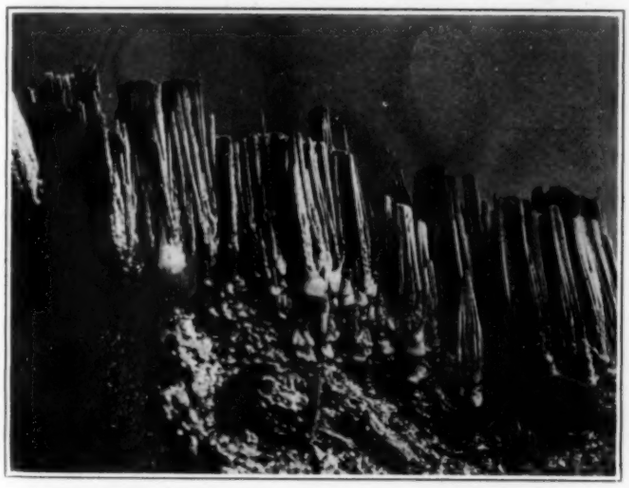


Fig. 4—Beehive Coke Surface
Showing comb-like growth of vitreous carbon.

Fig. 6—Byproduct Coke Surface
Showing carbon glaze.

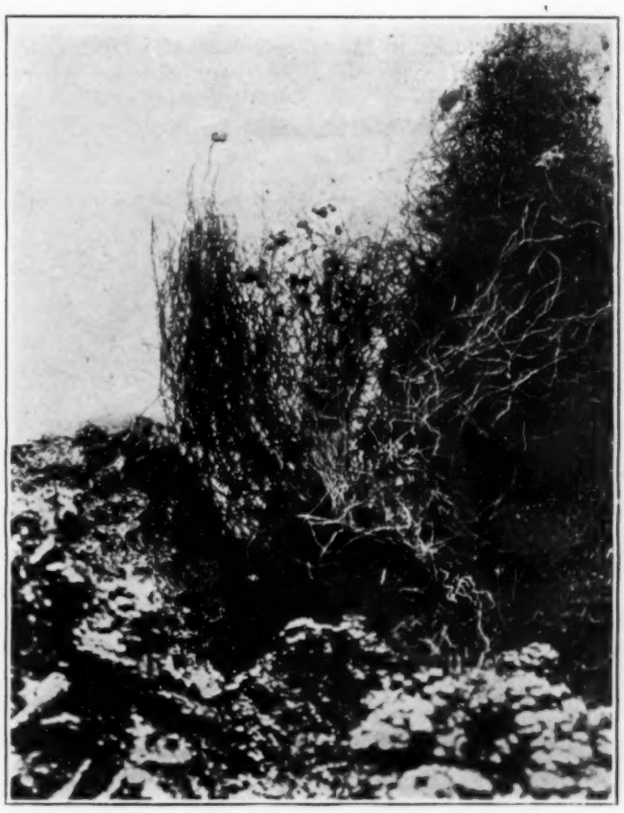


Fig. 5—Beehive Coke Surface
Showing growth of "coke hair."

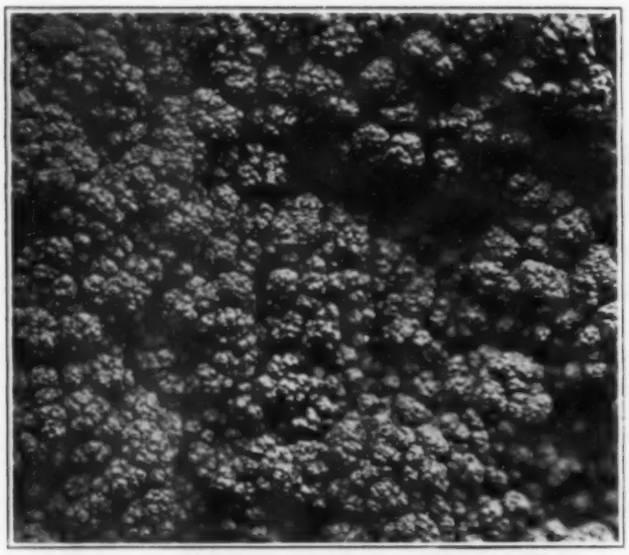


Fig. 7—Deposit of Carbon on Coke-Oven Wall
Showing formation on side facing wall.

heat due to the partial combustion accounts for this increased liberation of carbon, I have not been able to ascertain as yet. Such conditions of partial combustion exist in the beehive oven during carbonization, due to the admission of air in the top of the oven. An excessive heat is created, causing a lively decomposition of the hydrocarbons so that the carbon is deposited upon the coke surfaces facing the crevices due to the shrinkage of the charge. The surface of the beehive coke in Figs. 1 and 2 must be attributed to such actions and it should be understood that this appearance has nothing whatever to do with the mode of quenching. Even if such surfaces are exposed to the open air for a limited time before being quenched, their appearance would hardly suffer in that the coating of vitreous carbon on the surface oxidizes only very slowly. Where streams of gas very rich in heavy hydrocarbons impinge upon such coke surfaces at high temperature for any length of time, the carbon deposits begin to grow

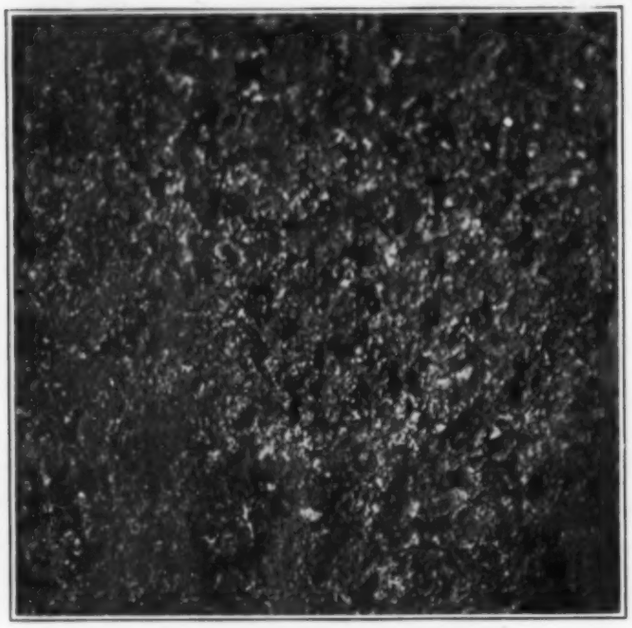


Fig. 8—Deposit of Carbon on Coke-Oven Wall
Showing formation on side away from wall.

as shown in Fig. 3 or they may take the shape of combs as shown in Fig. 4. A last peculiarity noted sometimes in crevices of beehive coke is the so-called coke hair, consisting of practically pure carbon with traces of sulphur. Its formation has not been properly explained yet, but the late Professor Simmersbach accounted for it as a decomposition of methane in a very hot hollow space in the beehive oven charge.

All these remarkable peculiarities of the beehive coke being apparently absent in byproduct coke, the question remains to be answered why there is such a marked difference in the coke surfaces produced in these two types of ovens, as in both cases the carbonizing itself runs on quite identical lines. In answering this question, it should be mentioned at the start that to a close and patient observer similar surface formations, though not quite so pronounced, can also be detected on byproduct coke. Many beehive ovens and those from which the pieces shown in Figs. 1-5 were selected are charged with run-of-mine coal. Between the lumps of

Fig. 9—Beehive Coke Surface
Showing that the coal has been in a plastic state during carbonizing.

coal hollow spaces cannot be avoided causing the gas driven from the facing surfaces of the charge to pass upward through a passage that offers the least resistance. A crack or split is formed in these places in the upper layer of the charge and, by the partial combustion above, so much carbon is liberated and deposited in the form of graphite that such peculiar growths are gradually formed.

If the above theory be correct, that a thick carbon deposit can be formed upon coke surfaces exposed to a stream of hydrocarbon gases, it should be possible to produce the same effect by admitting air to a byproduct coke-oven chamber to create a partial combustion while the stream is directed over the coke surface. A piece of byproduct coke from a particularly hot oven showing quite a smooth and glossy surface similar to beehive coke is shown in Fig. 6, where the cell structure is completely covered by a glaze of vitreous carbon. This oven had either too much suction for a considerable time or a leaky door; and, if the carbon glaze is not so thick and pronounced as on the beehive coke in Figs.

1 and 2, one must consider that the time required for the carbonization of the charge in the byproduct oven is only a fraction of that required in a beehive oven, and thus there is no chance for depositing carbon growths like those shown in Figs. 3 and 4.

Where sufficient time is given, carbon growths produced in byproduct ovens can be observed as shown in Fig. 7. It was mentioned in a preceding article on "Formation of Coke" (*Chem. & Met.*, vol. 30, No. 6, p. 222), that in decomposing hydrocarbon gases the liberated carbon is partly deposited upon the coke and partly upon the oven walls. In discharging the oven the carbon deposit is scraped off from the side walls as long as they are intact, but if they are bulged outwardly the carbon deposit may take the shape of flakes that are smooth on both sides. If the oven walls are subjected to chemical attacks from a coal containing large

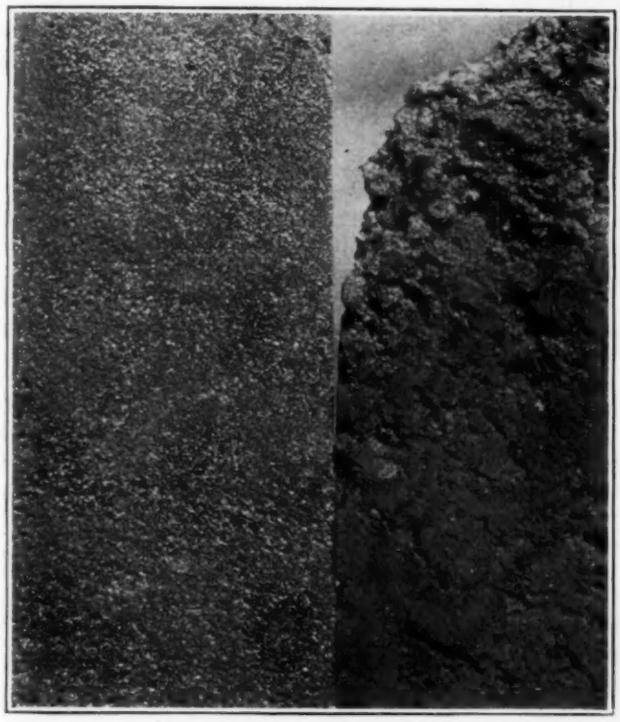


Fig. 10—Comparison of Coke Structures
Coke from flotated coal slime on left, and from raw slime on right.

amounts of salt, the portions of the wall eaten away are filled with carbon deposits, of which Fig. 7 shows a piece which with its warty projections resembles very much the coke surface of Fig. 2. The main difference rests with the lack of gloss and luster of the carbon in Fig. 7, and this must be attributed to the fact that the oven from which this piece was taken had to be cooled down slowly so that the surface suffered by gradual oxidizing. The surface shown in Fig. 7 is the one adhering to the wall—that is to say, the more the wall is eaten away by the chlorides the more carbon was deposited underneath the flake to fill up the hollow spaces. On the back, facing the charge, the carbon flake was rubbed smooth each time the coke was discharged. This surface is reproduced in Fig. 8, showing a certain porosity of the carbon, which may also be due to oxidizing while cooling the oven. The flakes are ½ to 1 in. thick, depending upon the condition of the wall face. They do not form a protection of the wall by any means, since the gases and acid vapors diffuse

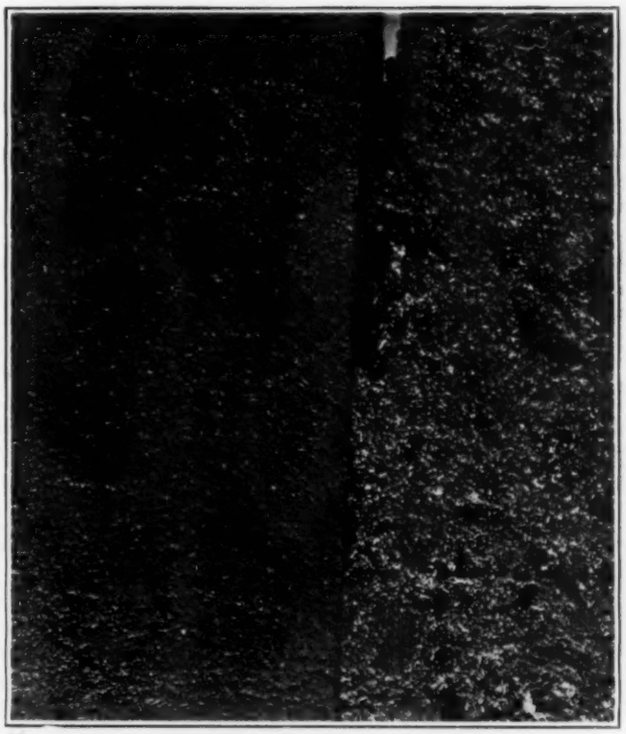


Fig. 11—Comparison of Coke Structures
Coke from flotated coal slime on left, furnace coke on right.

ANALYSIS OF COKE PIECES SHOWN IN FIGS. 10, 11 AND 12

	Left Side of Figs. 10, 11, 12 Coke From Flotated Coal Slime Per Cent	Right Side of Fig. 10 Carbonized Raw Coal Slime Per Cent	Right Side of Fig. 11 Common Blast-Furnace Coke Per Cent	Right Side of Fig. 12 Special Foundry Coke Per Cent
Moisture	0.06	1.49	5.75	4.46
Volatile matter	0.60	0.42	0.98	0.43
Ash	5.46	24.48	9.88	8.64
Fixed carbon	93.88	73.61	83.39	86.47
	100.00	100.00	100.00	100.00
Sulphur	0.406	1.3	1.23	0.917
Porosity	51.22	.....	58.76	47.97

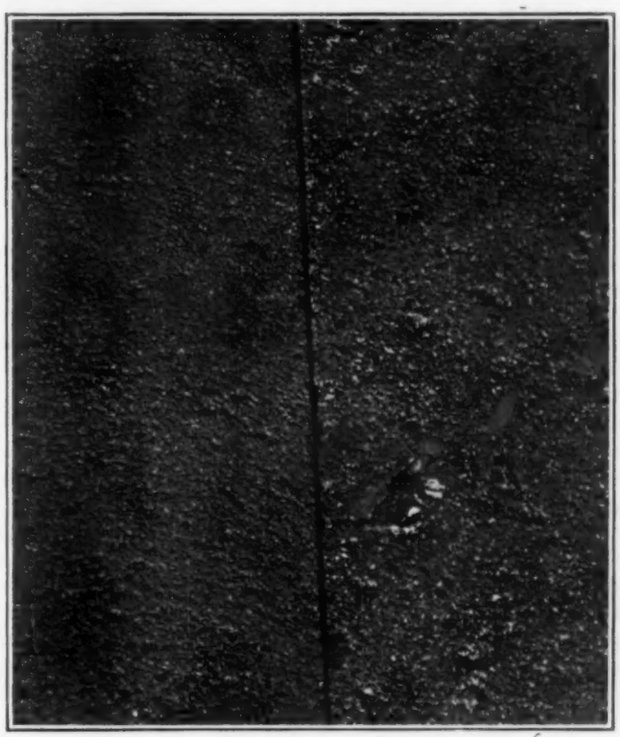


Fig. 12—Comparison of Coke Structures
Coke from flotated coal slime on left, foundry coke on right.

through the carbon and in addition these carbon deposits impair very materially the heat transmission of the brickwork.

Also coke hair can, in rare instances, be noted and has been repeatedly observed by the writer between the wall ends of byproduct coke in the crevices of pieces such as shown in Fig. 4 of the article published in *Chem. & Met.* for Feb. 11, 1924, pp. 222 to 227, if the oven is exceptionally hot. Owing to the comparatively short coking times and the fine grain of the coal they do not appear in such abundance as in beehive ovens and are in the majority of cases destroyed during discharging and quenching.

In the article on the theory of coke formation it was mentioned that the theory of the coking seam assumes a plastic state of the coal, a fact often doubted but which Professor Parr was able to substantiate by

Fig. 13—Surface of Coke From Low-Temperature Process

a crucible test. By the surface of a piece of beehive coke, shown in Fig. 9, I am able to give a plain proof of the correctness of this theory from actual practice. The surface of this coke has been facing a hollow space in the charge and by the influence of pressure and heat the plastic seam has been partly squeezed out so that the plastic coal ran downward, was solidified and later on covered by a glaze of vitreous carbon. It may be said to controvert this assumption that the tar condensed in a cool zone of the charge ran downward in the shape of a large drop and was coked, thus leaving this formation behind. However, in testing these growths for ash they were found to contain practically the same percentage of ash as the rest of the charge, proving that they consisted originally of plastic coal and not of tar only.

The coke structure consists of a multitude of cells or pores which are formed while the coking seam is in a plastic state, and the vaporized resinous or bituminous parts of the coal perforate this plastic mass by escaping in very fine streams. Different from charcoal, the cells of coke are not capillary channels through which air can be blown; but, as the plastic state affected at one time consists of only a very thin seam, the length of these pores may be infinitesimally short and their ends wholly or partly obstructed by the edges of the cells underneath or above them. The number of pores in coke or their open area in a given volume depends thus to a great extent upon the fineness of the coal particles and also upon the temperature applied, as will be shown further on. An important factor to be taken into consideration in this connection is the chemical properties of the coal. The smallest coal available without mechanical grinding is produced at plants provided with a coal washery in the form of washery slimes, which are to a certain extent considered a waste product and are often difficult to dispose of.

The writer attempted to carbonize such slime, but owing to the high content of water and ash the heat penetrated the charge very reluctantly. No formation of cells or pores could be noted in the residue after coking and no binding effect had been produced. Some lumps stuck together, but could be easily crumbled to pieces with the fingers. The surface of a piece of coke made from such washery slime is shown, slightly ground, in Fig. 10, to the right. The same slime was treated in a flotation plant of Minerals Separation, Ltd., of London; and, under identical coking conditions, yielded an excellent lumpy coke of which Fig. 10 shows a ground surface, to the left, in natural size. The purity of this coke is obvious, particularly if, as in Fig. 11, compared with the surface of a piece of normal metallurgical coke, shown on the right. The superior quality of the coke made from flotated coal is also in evidence if, as in Fig. 12, compared with a piece of very dense foundry coke of best quality, shown on the right. The comparative analyses of both cokes for each cut are given in the table. The comparison shows that, as far as the structure of the coke is concerned, the finer the coal is ground the denser will be the coke, and this dense coke structure will be the more porous the purer the coal and the higher the temperature applied to the coke oven.

Fig. 13 shows the surface of a piece of low-temperature coke in natural size made from run-of-mine coal of which the lumps were broken up, down to 1 in. in size as a maximum. As can be recognized by the shale splints in the structure, the coal had not been washed and though very little cell structure is in evidence, this coke is easily combustible. In a later article the combustibility of the coke in relation to its surface and structure will be discussed.

Newsprint Production Makes New High Record

Newsprint production in North America reached a new high mark in 1923. This fact is thought to reflect health in the groundwood pulp industry. The total for the United States and Canada surpassed by 218,000 tons, or nearly 9 per cent, the previous high mark of 2,530,000 tons in 1922. R. S. Kellogg, secretary of the Newsprint Service Bureau, reported at the recent annual meeting.

Mills in the United States produced 1,485,000 tons of newsprint, or 37,000 more than in 1922, and also more than any previous year except 1920, when the total was 1,512,000 tons.

A Plan to Administer

Patents of Government Employees

Official Report of Conclusions Reached by a Special Board After Studying the Problem for the Past Year and a Half

EDITOR'S NOTE: The accompanying report of the Interdepartmental Patents Board relative to the proper disposition of patents growing out of the work of government employees is of direct importance to the technical industries of the United States. It is published in full for two reasons. First, it gives a clear and correct statement of the present legal status of such patents, particularly with respect to personal ownership by the employees. These points are covered in items numbered 1 to 6 inclusive. Second, it expresses the official conclusion reached by the Interdepartmental Patents Board as to the best method of handling these patented inventions, concluding with the recommendation of two bills for Congressional action. These bills have been introduced in the Senate and are numbered S. 2387 and S. 2388. Editorial comment on the entire subject appears in this issue.

THE PRESIDENT, November 30, 1923
The White House.

Subject—Report of the Interdepartment Patents Board

My dear Mr. President—

On Aug. 9, 1922, the President, by executive order, appointed a board known as the Interdepartmental Patents Board, composed of representatives of the Departments of War, Commerce, Agriculture, Justice and the Interior, to consider the subject of patents within the government service and to recommend through the Secretary of the Interior, for his approval, suitable regulations establishing the policy to be followed by the government with respect to handling inventions and patents evolved by government employees and other inventions and patents acquired by the government. In view of the act of March 4, 1909, section 9 (35 Stat., 1027) this board has functioned merely as an informal committee of members of the departments represented, considering the subject of patents and their administration, primarily as of interest to their respective units.

On Nov. 23, 1922, the representative of the Department of Justice retired from the board, and on Nov. 24, 1922, a representative of the Navy Department was added to its membership.

The board has considered with care and deliberation the problems presented and begs to submit herewith their findings.

PRESENT LEGAL STATUS

The following facts have been developed:

1. The government has the right to accept assignment of and to take title to, a patent, acting in this behalf through one of its administrative officials.

Among acts and decisions supporting this opinion are the following:

The fortifications appropriation act, July 6, 1916, (c. 225, 39 Stat. L., 348).
The same act (39 Stat., 347).
The navy appropriation act, March 4, 1917 (c. 180, 39 Stat. L., 1169).
The joint resolution of Feb. 8, 1918 (c. 13, 40 Stat. L., 435).
The deficiency appropriation act, Nov. 4, 1918 (c. 201, 40 Stat. L., 1020).
The army appropriation act, June 5, 1920 (c. 240).
Solomons vs. United States (137 U. S., 342).
James vs. Campbell (104 U. S., 356).

2. It has not been determined that the government, in the absence of legislative sanction, has the right to dispose of a patent owned by it either by sale or license. A patent is a form of property, and government property can be disposed of only by authority of Congress.

3. In the matter of patents the relation of the government toward its employees is the same as that of any other corporate employer toward its employees (Peck vs. Standard Parts Co., 282 Fed., 443, 452; Solomons vs. United States, 137 U. S. 342), excepting as modified by the statute of June 25, 1910 (U. S. Stat. 36, 851), amended on July 1, 1918 (U. S. Stat. 40, 704-705) to read as follows:

That whenever an invention described in and covered by a patent of the United States shall hereafter be used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, such owner's remedy shall be by suit against the United States in the Court of Claims for the recovery of his reasonable and entire compensation for such use and manufacture;

Provided, however, That said Court of Claims shall not entertain a suit or award compensation under the provisions of this act where the claim for compensation is based on the use or manufacture by or for the United States of any article heretofore owned, leased, used by, or in the possession of the United States:

Provided further, That in any such suit the United States may avail itself of any and all defenses, general or special, that might be pleaded by a defendant in an action for infringement, as set forth in Title Sixty of the Revised Statutes, or otherwise.

And provided further, That the benefits of this act shall not inure to any patentee who, when he makes such claim, is in the employment or service of the government of the United States, or the assignee of any such patentee, nor shall this act apply to any device discovered or invented by such employee during the time of his employment or service.

LEGALITY OF PERSONAL OWNERSHIP

4. Legally, in the absence of a contract providing otherwise, any patent taken out by a government employee and any invention developed while in the service of the government is the sole property of the employee to do with as he may see fit, subject, however, to the act of June 25, 1910, amended on July 1, 1918, as set out in the previous paragraph.

Among the cases in support of this opinion are the following:

Dalzell v. Dueber Watch Case Co. (149 U. S., 315).
Gill v. United States (160 U. S., 426, 435).
Hapgood v. Hewitt (119 U. S., 226).
Mississippi Co. v. Franzen (Circuit Court of Appeals, 3rd Circuit, 143 Fed., 501).
National Box Co. v. Healy (189 Fed., 49, 56).
Peck v. Standard Parts Co. (282 Fed., 443, 452).
Pressed Steel Car Co. v. Hansen (137 Fed., 403 in the 3rd Circuit).

5. The law of March 3, 1883, provides as follows:

The Secretary of the Interior and the Commissioner of Patents are authorized to grant any officer of the government, except officers and employees of the Patent Office, a patent for any invention of the classes mentioned in section 4886 of the Revised Statutes when such invention is used or to be used in the public service, without the payment of any fees; *Provided*, That the applicant in his application shall state that the invention described therein, if patented, may be employed by the government or any of its officers or employees in prosecution of work for the government, or by any other person in the United States without the payment to him of any royalty thereon, which stipulation shall be included in the patent.

It has been held by the Judge Advocate-General of the army, under date of Nov. 30, 1918, and by the Attorney-General of the United States, under date of March 22, 1920 (32 Op. A. G., 145), that this act does not work a public dedication of a patent taken out under it, as theretofore generally assumed, but that it provides simply a free use of the patent to the government and to anyone in the prosecution of work for the government, otherwise leaving unrestricted ownership of the patent in the patentee. This view of the intent of this act has not yet been tested in a court.

In a decision of the Commissioner of Patents (ex parte McNary, Dec. 20, 1918) the Commissioner said, *inter alia*, "It may be seriously questioned whether a patent can be granted when in the grant it is stated that anyone in the United States has a right to use the invention." This decision was rendered with regard to a custom which had grown up in the Patent Office of having the Public Printer print "Dedicated to the Public" upon the printed copies of a patent taken out under the act of 1883.

6. Public dedication of an invention would, if the question raised in the decision of the Commissioner of Patents above referred to is well founded, prevent the issue of a patent for it, and it is submitted that if a patent already granted should be dedicated to the public it would be thereby nullified, since a patent is a monopoly, and the free gift of it to the public would destroy the monopoly.

Interdepartmental Patents Board's Deductions

With regard to the government's attitude toward inventions and patents of its employees, the following deductions have been made:

Inventions evolved by government employees fall broadly into two classes: (1) Those which do not refer to and are not evolved in the line of duty of the employee. (2) Those which arise in connection with and as a result of the employee's official duties. With the first class it is submitted the government should properly have no concern, excepting as provided by the statute of June 25, 1910, as amended July 1, 1918 (as above set out), and it is the second class that will be specifically referred to and dealt with here.

There has never been any general governmental policy established concerning these inventions, and misunderstandings and embarrassment have continually arisen with regard to them, on the part severally of the employee, the government and of outside interests. Many technical ideas that arise during the scientific work of the government bureaus might be developed into valuable inventions, but are now lost because of the want of a proper patent policy clearly defining the inventor's status and thus removing obstacles to the full development of his talent. Many inventions that do take tangible form merely find place in technical publications and are developed no further toward useful application.

Three general courses for handling these inventions seem open for consideration:

1. Public dedication of the patent.

2. Non-interference with the patentees in the exploitation of their patents.

3. Government control and administration.

Against the first course stands the view that public dedication in effect voids a patent, and also the fact that even if this were not so, there is little incentive for anyone to take up a patent and spend time, effort and money, running often into the thousands and even hundreds of thousands of dollars, on its commercial development without at least some measure of protection against others free to take the patent as developed by him and compete in its use. In such a case one of the chief objects of the patent law would be defeated.

With regard to the second course, it must not be lost sight of that in general it is the constitutional right of every patentee to exploit his patent as he may desire, however expedient it may appear to endeavor to modify this right in the interest of the public when the patentee is in the government service.

Finally, with regard to the assignment of a patent to the government, it is submitted that at present the power of the government to administer such a patent, in the absence of special legislative authorization, is doubtful.

Classification of Patents

The patents of government employees evolved in the line of their duty may be classified as follows:

1. Inventions which in the national defense or otherwise in the public interest should be kept secret, and which the government therefore desires to control exclusively.

2. Inventions which have been developed in a bureau's field of work, in which inventions the public's interest is paramount and would be best protected by government control.

3. Inventions of such a nature that the government desires merely a shop right or implied license. The power to use without being liable to suit is already provided by the act of June 25, 1910, as amended July 1, 1918.

4. Inventions in which the government is not primarily interested, which are mainly for use in industry and which require commercial development with adequate protection to make them effective.

Concerning classes 1 and 2, there can be no doubt as to the necessity for government ownership or control. With regard to classes 3 and 4, two alternatives present themselves, first, assignment of such patents to the government, and second, retention and exercise of rights of ownership by the patentees.

Under the first alternative legislative authority might be secured to make it a condition in the terms

of the employee's service to assign all patents he might take out to the government, to administer as might seem indicated, but it is submitted that this would act as a deterrent upon the exercise of the inventive impulse so essentially a part of many important phases of research work; that it would, on the one hand, render difficult securing the best sort of technical men for the service, and on the other, would influence technical workers to resign in order to exploit inventions which they might evolve and suppress while still in the service. There has always been more or less of a tendency for able men in the service to do this, particularly in view of the comparative meagerness of government salaries; thus the government has suffered loss among its most capable class of workers.

It would seem therefore indicated that employees developing inventions falling within classes 3 and 4 should be allowed to patent them and exercise their right of ownership in such patents. If it be objected that this would have a tendency to encourage a man to develop his work along lines profitable to himself to the detriment of the service and might make demands upon his time that would interfere more or less with his official duties and thus impair his usefulness to the government, it is conceived that these tendencies could be corrected by the inventor's superior officers, through the exercise of routine administrative measures. Exploitation of a patent to the embarrassment of the government could be controlled by provision for forfeiture of the patent, in such case, to the government.

Need for Regulations

With respect to patents owned by the government derived from any source the following information will disclose the urgent need for regulations providing for their proper administration. Attention is invited to the fact that the government owns, or is licensed, under upward of 30,000 patents, largely acquired during and since the war. Many of the inventions disclosed in these patents are prevented from becoming valuable because they are not available for general public use from lack of Congressional authority, as indicated in paragraph 2 of this report. It is reported that there have been numerous requests for licenses under government-owned patents, the granting of which lacks this direct Congressional authority.

Another matter which it is desired to stress is the fact that many of the suits now pending in the courts against the United States for infringements of patents are based upon the use of inventions which were developed in the government service, and are not protected by patent or otherwise, in many instances because of the desire to keep the inventions secret.

The amount claimed in suits against the United States for infringement of patents now pending in the courts is estimated at approximately one billion dollars.

Within the spheres of the activity assigned by Congress to the various establishments and departments, it is as important to the government as to any other concern that it keep, by improvement and invention, in the forefront of progress. It is the understood function of all of the technical bureaus of the government, that they shall be in advance of rather than lag behind in the development of their arts.

Recommendation

In light of the above considerations, especially in view of the fact that there are many inventions and patents in the government service, owned either by the government or its employees, urgently requiring definition as to status and policy as to administration, the Interdepartmental Patents Board recommends that the attached bills be transmitted to Congress for as early consideration as may be possible, to wit:

1. A bill to authorize the President to constitute an Interdepartmental Patents Board.

2. A bill to authorize the President to withhold from publication and place in a secret file any patent which in his opinion would be detrimental to the national defense.

All members of the board concurring.

Respectfully,

ANDREW STEWART,
Chairman.

A Bill to Authorize the President to Constitute an Interdepartmental Patents Board

Be it enacted by the Senate and the House of Representatives of the United States of America, in Congress assembled, that the President is hereby authorized to constitute an Interdepartmental Patents Board, composed of one representative of each of such of the government departments and independent establishments as in his opinion may be desirable, such representatives to serve without extra compensation. and the duties of said board to be as follows:

1. To act as so'e agency through which all patents and patent rights hereafter conveyed to the government shall be acquired, and to have custody of the records of, and to control and administer on behalf of the government the right, title and interest in and to all patents and patent rights owned by the government, provided that the title to any patent or patent right otherwise acquired by the United States shall not be invalid for that reason.

2. To issue non-exclusive licenses under patents owned by the United States to such individuals, firms or corporations, and on such terms, as may in the said board's judgment be in the public interest. Any moneys received in respect of licenses granted hereunder shall be covered into the Treasury under the head of "Miscellaneous Receipts."

3. To keep a record of all patent applications and unexpired patents of government employees, and rights therein or incident thereto, and it shall be the duty of all government employees to register with the said Interdepartmental Patents Board, in such manner as the board shall direct, all applications for patents they may make and all patents that may be granted to them, individually or collectively, on any invention discovered or developed during the period of their employment in the government service.

4. It is hereby expressly made a part of the terms of employment of any government employee, having the effect of a contract, that any patent application hereafter made or patent granted appertaining to any invention discovered or developed during the period of his government employment and incident to the line of his official duties which in the judgment of the said board should in the interest of the national defense, or otherwise in the public interest, be controlled by the government, shall upon demand by said board be assigned by said employee to the government.

Authority is hereby granted such board to perfect its organization and to make such regulations for performing its duties above set out as may in its judgment be required, subject to the approval of the President.

There is hereby appropriated a sum not to exceed $25,000 to be charged to any balance in the Treasury not otherwise appropriated for the payment of clerical assistance and for other purposes necessary in carrying out the provisions of this act during the current fiscal year.

An Act to Authorize the Issuance and Withholding and Secrecy of Patents Essential to National Defense

SECTION 1. Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, that the President, or such person or agency as he may designate, shall, whenever the publication of an invention by the granting of a patent would, in his opinion, or in the opinion of the said designated person or agency, be prejudicial to the national defense, order that the patent

be sealed and kept in a secret file until released by the order of the President or the said designated person or agency; *Provided*, that the said patent may be held forfeited upon establishment of the fact that in violation of the secrecy of said order said patent invention was published, or that an application for patent for said invention was filed in any other country by the inventor, or his heirs, administrators, executors or assigns, without the consent, approval or license of the President, or said person or agency.

SECTION 2. Where a patent is withheld from publication, as aforesaid, the patentee, his heirs, administrators, executors or assigns, shall, upon failure to agree with the President, or the said designated person or agency, to a reasonable compensation therefor, have the right to sue in the Court of Claims for such compensation as the court in its judgment may deem fair and reasonable for the deprivation to the patentee of his rights under the said patent; *Provided*, that the proceedings in any such suit shall be, upon the request of the legal representative of the government, held in secret; and *Provided further*, that in any such suit the United States may avail itself of any and all defenses, general or special, that might be pleaded by a defendant in an action for infringement, as set forth in Title 60 of the Revised Statutes, or otherwise; *Provided further*, however, that the placing of a patent in the secret file upon the order of the President, or the designated person or agency, shall be deemed a tender of the invention by the patentee to the United States and acceptance by the United States in contemplation of this act.

Fineness Standard for Pulverized Fuel

Powdered or pulverized coal is extensively used as a fuel, the total annual consumption in the United States being about 12,000,000 tons and growing steadily. As the coal is usually pulverized so that 70 per cent or more passes through a 200-mesh sieve, it presents difficulties in sieving, because such finely divided material tends to clog the meshes. A fineness test is desirable in order to judge the efficiency of the pulverizing apparatus and as an indication of the particle size of the coal being burned.

Committee D-5 on coal and coke, American Society for Testing Materials, has recognized the desirability of a standard method for determination of fineness of powdered coal. The Bureau of Mines, in co-operation with this committee, conducted sieving tests on two standard samples of powdered coal, which are described in a recent publication on the subject, serial 2,545, by W. A. Selvig and W. L. Parker. As a result of this work a method for making fineness tests, by hand sieving, is recommended as a standard method, while a rapid method, by machine sieving, is given for routine tests.

Japanese Rubber Industry Expanding

The Japanese rubber industry has made great strides in its development since the war, according to statements of the Tokio Chamber of Commerce. The gum material imported in the war period reached no more than 1,000 tons and in 1919 amounted to more than 10,000 tons. In 1920 the volume decreased owing to the heavy business depression, but it broke the former level in 1921, as 23,000 tons were imported. The volume imported in 1922 decreased to 16,000 tons. This was occasioned by the fact that the excessive supply since 1920 caused the price to fall violently, with the result that many manufacturers were bankrupt or in difficult straits. The British Government ordered them to restrict the output and furthermore, it is claimed by the Chamber, forced the gum exporters to curtail the volume exported.

The value of rubber articles manufactured in 1920 was about $17,000,000, and though it was generally expected that the value would show a considerable drop owing to the high price of rubber material, the domestic demand advanced so as to send the value up to more than $20,000,000.

Throughout the country 554 works are engaged in manufacturing all kinds of rubber articles and the operatives number 17,212. The most important rubber manufacture is toys, the value of which was more than $800,000 in 1922. This class of goods is being exported in large quantities to Australia, South America and India. Rubber tires are produced and exported to China and the Dutch Indies.

New Specifications for Whiting

In Circular 152 of the Bureau of Standards are given new recommended specifications for ceramic whiting, as follows:

Ceramic whiting is a finely ground white powder composed of nearly pure calcium carbonate or calcium carbonate and magnesium carbonate obtained from pulverizing and sizing chalk, marble, or limestone, or as a chemically precipitated product. It is used to furnish the calcium oxide component of glazes, enamels and fluxed ceramic bodies. It is an active fluxing agent, rarely used in large quantities in body mixtures. It may be used either as a raw ingredient in glazes or fritted or smelted with other glaze materials before application.

Packing—Whiting is packed and shipped in barrels holding not more than 325 lb. or bags holding not more than 125 lb. The package should be labeled, stating whether the contents is a natural rock whiting or a chemically precipitated whiting.

Quality—Whiting shall be uniform in quality (from shipment to shipment), both as to fineness of grain and composition. The calcium, magnesium or total carbonates shall not vary more than 1 per cent and the silica not more than one-half of 1 per cent from a figure set by contract within the limits of the composition shown in class 1 or class 2. It should be manufactured from the purest rock available and should be practically free from particles of pyrites, iron-bearing silicates, metallic iron and gypsum.

Composition—Whitings shall be divided into two classes, No. 1 being practically a pure calcium carbonate and No. 2 containing calcium carbonate, with a considerable percentage of magnesium carbonate within the limits of the composition given. This does not indicate that one class is inferior in quality to the other, but indicates that numerous users prefer the magnesium whiting to the pure calcium whiting.

Table I—Composition

Constituents	Class 1		Class 2	
	Maximum Per Cent	Minimum Per Cent	Maximum Per Cent	Minimum Per Cent
Total carbonates	....	97	....	97
$CaCO_3$	....	96	....	89
$MgCO_3$	2	..	8	..
FeO_3	0.25	..	0.25	..
SiO_2	2	..	2	..
Total S computed to SO_3	0.1	..	0.1	..

Fineness—Screening samples by washing for 10 minutes with stream of water practically without pressure shall not leave a residue of more than 1 per cent on a No. 140 screen (or more than 2 per cent on a No. 200 screen), and at least 98 per cent of the material shall pass a No. 200 screen. It shall also be so fine that a separation made by a Pearson air separator will show at least 85 per cent of the material finer than 0.02 mm. and at least 48 per cent finer than 0.01 mm.

Steam Versus Vacuum Treatment for Preserving Wood

R. M. Wirka has carried on a long series of experiments on the effect of variations in steam and vacuum treatment of wood, at the Forest Products Laboratory, Madison, Wis. The material was Southern pine of pole or pile size, cut to 40-in. length, the bark being removed. Internal temperatures were measured in a central thermometer hole.

Steaming for 4, 6 and 8 hours respectively at a pressure of 20 lb. per sq.in., followed by a 20-in. vacuum for 3 hours, showed highest internal temperature for the longest time of steaming; no severe checking occurred and no through checking in any of the specimens. Six hours steaming at pressures of 20, 40 and 60 lb. respectively, followed by 2 hours vacuum, showed highest interior temperature for the highest steam pressure, but after the vacuum treatment the internal temperatures were in inverse order of the steam pressures; this may have been caused by transfer of heat through checks, as the high-pressure specimens checked severely, though no through checks occurred, as shown by testing with air applied to the thermometer well. Vacuum periods of 1, 2, 3 and 4 hours respectively, following 6 hours steaming at 20 lb., showed that the reduction of moisture increased with the length of vacuum; the internal temperatures were irregular.

Tests to determine the time at which an internal temperature of 212 deg. F. is reached at various depths from the surface, under 20 lb. steam pressure treatment, showed that for radial distances of 2.5, 3.5, 4.5 and 5.5 in. respectively the required steaming time was 5.7, 6.3, 7.0 and 9.4 hours. Another series of tests showed that the internal temperature became equal to the mean temperature after periods of 17 to 22 hours for radial distances of about 3½ in. and 38 hours for a radial distance of 5½ in. No distance advantage of the long over the short steaming period was noted in so far as loss of moisture and final temperatures are concerned. The long steaming produced through checking.

Hydrocarbons have been found to give a higher toxic effect in wood-preserving treatment than other compounds. Further study of this subject by Ernest Bateman and C. Henningsen, of the Forest Products Laboratory, dealt with twelve hydrocarbons derived from coal tar or petroleum oils. It was concluded that hydrocarbons of the paraffine series are probably more toxic than the aromatic compounds of the same number of carbon atoms, but are generally too slightly soluble in water to be of value.

New Detonating Compound Investigated

Among the recently patented detonating compounds that have been suggested as substitutes for the commonly used fulminate of mercury is the normal lead salt of trinitroresorcin, or styphnic acid. As no data concerning its use or practicability were available, a study of its properties has been made in the explosives laboratory of the Department of the Interior, at the Bureau of Mines experiment station at Pittsburgh, Pa.

Normal lead trinitroresorcinate was first prepared and patented by Herz; it probably found some use during the World War, but no record of its performance is available.

The results of the studies of the Bureau of Mines show that normal lead trinitroresorcinate can be obtained with almost quantitative yield by closely following the patent directions. It is about 75 per cent as strong as mercury fulminate, insensitive to friction and less sensitive to impact than fulminate. It cannot be used as an initiator of military high explosives, but will detonate some industrial dynamites. Mixtures of normal lead trinitroresorcinate and potassium chlorate are stronger than the pure trinitroresorcinate and about the same strength as straight mercury fulminate.

The results of this study are given in Serial 2,533, by C. A. Taylor, explosives chemist, and W. H. Rinkenbach, assistant explosives chemist, which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Study of Soil Corrosion of Pipes May Lead to Significant Improvements

George K. Burgess, director of the Bureau of Standards, presents a very interesting résumé of the soil corrosion studies now under way in the following communication:

"The whole question of soil corrosion and soil testing from the corrosion standpoint is at present in a very unsatisfactory state of development. The factors that influence the corrosion of iron buried in soil are so numerous and so mutually interdependent that the problem of determining whether or not a particular soil is corrosive is an extremely complicated one and has not as yet been satisfactorily worked out. One of the most common tests of soil to determine whether or not it will be corrosive to iron pipes is the determination of the hydrogen-ion content, but there is a great deal of experimental evidence available to show that this test is a very unreliable one at best. While it is true that a strongly acid soil will in general be more or less corrosive to iron, its effect on different kinds of iron will vary greatly and many soils that have no acid reaction whatsoever are found to be even more corrosive to iron and steel than soils which do show acid reaction. The test, therefore, cannot be regarded as dependable.

"Because of the unsatisfactory state of our information relating to this subject and because of its practical importance, the Bureau of Standards undertook, about 2 years ago, a comprehensive research on the whole subject of soil corrosion, the principal objects being, in brief, to determine the kinds of soils most corrosive to various kinds of iron and steel and other materials commonly used for pipe purposes, the relative resistance of different kinds of iron and steel to particular soil conditions, and to test the value of various commercially available coatings. When the investigation has progressed far enough, it is hoped also to be able to secure definite information as to laboratory methods of examining soils with a view of determining the corrosive action on iron.

"For the purpose of carrying out this investigation, a large number of different soils have been selected throughout the United States and large numbers of pipe specimens of all different kinds of iron and steel, some unprotected and others having various kinds of protective coatings, have been buried in each location. A portion of these specimens will be taken up at intervals of from 1 to 2 or 3 years for examination and study, and progress reports will be issued from time to time.

"This investigation has been under way nearly 2 years and we expect to issue a progress report in about 6 months."

The Story of Ferrochromium

Industrial Developments and Utility of the Material That Made Possible Stainless Steel and Rustless Iron

By Frederick M. Becket
Metallurgist, Union Carbide & Carbon Research Laboratories

The 1923 Perkin Medal has been awarded to Frederick M. Becket in recognition of "the most valuable work in applied chemistry." On receiving the award he presented a most interesting discussion of the field in which this work was done. This article is the second of three excerpts from Becket's discourse. The third will follow in a later issue of "Chem. & Met."

SO INTERESTING and extremely important is the element chromium in modern metallurgy that I first thought of taking it as the subject of my entire discourse. My own interest in the development of chromium alloys and the applications of chromium having been continuous during the past 20 years, I regret the necessity of omitting many experiences I should like to describe.

Chrome steels were among the very earliest alloy steels developed. During the period between 1880 and 1895 the properties of chrome steel were commercialized for a few specific purposes—for example, chromium-containing projectiles were manufactured that would penetrate any armor then in existence, so nickel and later nickel-chromium armor plate were developed in an attempt to make it withstand the improved projectile. To meet the demand of those days, ferrochrome was produced in furnaces of the crucible type and in small blast furnaces. Both processes were inefficient and costly, and the products were inferior in quality.

Moissan's laboratory work (1892-1895) with electric furnaces in the reduction of refractory oxides has of course become classic, and the Goldschmidt aluminothermic process was utilized at an early date in the commercial production of chromium. De Chalmot experimented in 1896 at Spray, N. C., on the reduction of chrome ores in the electric furnace. Then in 1897, Major J. T. Morehead, to whom the calcium carbide and ferro-alloy industries are so greatly indebted for his perseverance and foresightedness, converted a section of an old state canal at Holcomb Rock, Va., to a hydro-electric station and started the commercial production of ferrochromium. The demand for this alloy so increased, especially during the Spanish-American War, that Major Morehead deemed it wise to construct a larger plant at Kanawha Falls, W. Va., which commenced operation in 1901. This plant has been operating continuously on ferrochromium ever since that time, although it was purchased by the Electro Metallurgical Co. in 1907. The Holcomb Rock plant, also subsequently purchased by the same company, has been producing ferrochromium continuously for many years.

While independent of Europe during this long period in the manufacture of high-carbon ferrochromium—and indeed the two plants mentioned contributed to Europe in the early days of their history—this country had imported all of its supplies of the more expensive, low-carbon grades of ferrochromium, these being used to a less extent but nevertheless essential in many applications. Through purchase of the Niagara Research Laboratories, the Electro Metallurgical Co. acquired the rights to several of my early processes for the production of low-carbon ferro-alloys, and in 1907 the commercial manufacture of low-carbon ferrochromium was started in earnest. Since that time a very large proportion of the domestic consumption of this alloy has been produced at the Niagara Falls plant.

Metallurgically speaking, the manufacture of high-carbon ferrochromium (5 to 6 per cent carbon) has been a highly efficient operation for many years, gradual improvements having been made in the chromium recoveries and energy yields. Again speaking metallurgically and from the point of view of furnace design also, the problems involved in the commercial production of low-carbon ferrochromium (less than 0.50 per cent carbon) were vastly different and much more difficult. At Niagara Research Laboratories, where experimentation and occasional manufacture were generally conducted on a 500-hp. scale, these problems had been substantially solved. Great was the grief in the early days, however. The difficulty with furnace linings was in itself a nightmare, literally; and the electrode problem, together with the necessity of inhibiting contamination of the product by electrode carbon, required many innovations, as did numerous other factors.

Lower Carbon Content Demanded

Fifteen years ago the lowest carbon content demanded by the steel makers in this series of alloys was 0.50 per cent, but with modified steel practice and the introduction of new steels, carbon contents of 0.30 per cent and later 0.20 per cent were soon requested, and quite recently a demand has arisen for ferrochromium of a maximum 0.10 per cent content of carbon to meet the requirement of a very low-carbon rustless iron containing 12 to 14 per cent chromium. Electric furnace practice has followed the need, and today an alloy of maximum 0.10 per cent carbon is being produced containing 68 to 70 per cent chromium, in which the sum of the chromium and iron contents is not less than 99 per cent.

The various grades of low-carbon and low-silicon ferrochromium have been manufactured during this entire period through the agency of silicon reduction. This method has also been utilized for our production of low-carbon and low-silicon alloys of tungsten, molybdenum and vanadium, as well as the relatively pure metals manganese and chromium.

Historically, chromium alloys are very important. Probably the first well-established use of chrome steel was in the stamp shoes of milling machinery in the gold-mining districts. This use still exists, but it has

The importance to industry of the ferro-alloys is not generally appreciated, because they do not appear as finished materials. The case of ferrochromium is no exception, While its direct value to the chemical engineer is so small as scarcely to be distinguishable, its indirect influence on his field is of the first magnitude. It enters into some of his most valuable materials of construction, bringing with it not only strength and hardness but also resistance to corrosion.

been greatly expanded to include numerous parts of milling and other machinery, because of the excellent combination of the properties hardness, toughness and resistance to abrasion that are possible with chrome steels after heat-treatment. Great quantities of chromium have been used in warship armor and armor-piercing projectiles, and the efforts of rival armaments greatly hastened development of the art of heat-treating alloy steels. Merely mention the disarmament program and you will appreciate its effect on the manufacture of armor plate, but other important uses of chromium steels and new applications of chromium have been growing at an increasing rate. Either alone or in conjunction with one or more of the elements nickel, molybdenum, vanadium or tungsten, chromium finds its way into the great majority of alloy steels now produced. Such steels have been described so often in literature and their uses have become so widespread that I need not enter into details. Suffice it to say the control of both chemical composition and heat-treatment permits development of a wide range of the most excellent physical properties. Disregarding the effect of chromium on the hardening transformations, as well as other more or less theoretical points, the value of chromium may be briefly though crudely expressed by stating that it increases the strength and hardness of an engineering steel without destroying the toughness and ductility.

The chromium content of a large proportion of the alloy steels appears within the range up to 2 per cent. Steels for automobiles and other much heavier, high-duty machinery; armor, projectiles, and some ordnance steels; metal-working steels in many applications; and indeed a variety of steels for structural purposes contain less than 2 per cent chromium, many of them approximately only 1 per cent of this element.

Modern high-speed steels take us to a class in which chromium is generally used within the limits 3½ and 5 per cent, and 4 per cent chromium represents an average. These will be referred to again when discussing ferrotungsten, but in passing it may be well to emphasize the point that the remarkable property of retaining hardness and a cutting edge when operating so fast that the tool becomes red hot is due to a combination of chromium and tungsten, and not to tungsten alone.

Makes Stainless Steel Possible

Now let us take a higher jump in chromium content and land on the level of "stainless steel," which contains between 12 and 14 per cent chromium and enough carbon to impart the resiliency and hardness required for satisfactory cutlery. The non-corrodibility of chromium metal and ferrochromium has long been known. Aitchison of England has shown that chromium is more effective than any other alloying element in retarding the corrosion reactions, because it divides itself between the carbides and solid solution with greater concentration in the latter, and we therefore have one explanation of the non-rusting quality of stainless steel. It is a highly meritorious product deserving of greatly increased popularity, and many uses await it other than cutlery.

More recently, at least commercially speaking, "rustless iron" made its appearance, first in England and later in this country. It also contains between 12 and 14 per cent chromium; but it differs considerably from stainless steel in its carbon content, the latter usually running between 0.30 and 0.40 per cent carbon, whereas the percentage of carbon in rustless iron is preferably maintained below 0.10 per cent. This difference in carbon appreciably influences the properties. Stainless steel requires a hardening treatment to induce the condition of maximum non-corrodibility. Rustless iron does not require such heat-treatment; it is furthermore much softer than stainless steel and more readily rolled, forged and cold-worked. You will understand from a previous statement that in rustless iron containing less than 0.10 per cent carbon almost all of the chromium exists in the solid solution phase and in this state imparts its maximum effect on insolubility; but in stainless steel a much larger proportion of the chromium appears as chromium-containing carbides, which represents a less concentrated and more corrodible chromium-iron solution, as well as a condition affording much greater opportunity for electrolytic action between the carbides and solid solution. I might say that I have used the terms stainless steel and rustless iron because these terms are being commonly employed in this country.

The cost of producing rustless iron need not preclude diversified application. The material possesses great merit and enormous possibilities. It seems unnecessary to mention specifically present and contemplated uses, since you need not stretch your imagination to realize how vast are the quantities of metal annually going to the scrap heap through corrosion and how great are the expenditures for labor and materials in the use of protective coatings.

Important Alloys Discovered

By increasing the chromium content to 20 per cent or more we arrive at a group of products having rather unique and valuable properties. About 10 years ago in order to find a reasonably cheap alloy which would withstand oxidation at over 1,000 deg. C. in a tunnel oven, I made a series of experiments with chromium alloys to determine the lowest chromium content at which oxidation would not be progressive, knowing that commercial low-carbon ferrochromium possessed the non-scaling property to a remarkable degree. The results brought to light a rather sharp effect at approximately 20 per cent chromium, above which oxidation was practically negligible after weeks of exposure at 1,100 deg. C. The broader field of application possible with forged and rolled alloys of this class was of course obvious, and with additional experimentation this problem was solved.

While contrary to the literature on the subject, I have found that low-carbon chromium-iron alloys containing up to a little over 60 per cent chromium are forgeable, or may be made so by special heat-treatment. The 20 to 30 per cent alloys have been readily hot- and cold-worked not only to rods, wire, plate and other shapes, but seamless tubing has been produced. However, in marked contrast to these properties is the ex-

treme hardness of the high-carbon chromium-iron alloys of more than 20 per cent chromium, which results in a degree of abrasion resistance equaled by few metallic substances.

In the field of castings, some of these chromium-iron alloys have been commercialized by two or three companies in recent years, and a new industry has been established. In the forged condition, the combination of high tensile strength and resistance to oxidation at high temperatures suggests to the chemical engineer a wider use of the chromium alloys in the manufacture of retorts, stills and other apparatus, in which reactions may be carried on under pressure at temperatures rapidly destructive to ordinary steels.

The remarkable properties of the nickel-chromium series of alloys are well known. Being characterized by their high electrical resistivity and their resistance to oxidation at high temperatures, they find use in a great variety of electrical heating devices and in the furnace equipment of many industries.

We have heard of key metals. Tungsten has been so called. But without its companion chromium the value of the key would be greatly diminished. Indeed, chromium is essential to an even greater variety of industries, and I believe its potentialities are as far reaching as any of the less common metals with which it is usually classed.

Chromium Metal

The iron content of commercial ferrochromium alloys preclude their use in a few important applications, so I shall say a few words about the more costly material chromium metal, meaning by this term a product containing more than 95 per cent chromium.

So-called "carbonless chromium" manufactured by the Goldschmidt aluminothermic process was marketed for many years before production by electric furnace methods was undertaken in the United States about 10 years ago.

A gradual improvement has been shown in the quality of metal made in the electric furnace, so that we are now regularly producing a metal containing more than 98 per cent chromium and less than 1 per cent iron.

Chromium metal is chiefly demanded for use in some of the grades of nickel-chromium electrical resistance elements, to which I have already referred, and in the manufacture of Stellite, an alloy principally employed for tools of exceptionally rapid cutting qualities. In the non-ferrous alloys chromium finds use to only a small extent, but some of our own recent work indicates that this offers a fertile field.

Comparative Study of Tars to Be Made

A study of the comparative composition of various tars has been undertaken by J. D. Davis, chemist, Department of the Interior, attached to the Pittsburgh experiment station of the Bureau of Mines. Coal tars from the various sources will be distilled under uniform conditions by the Hempel method. The following tars will probably be tested: Low-temperature tars by the processes of Parr, Wallace, Carbocoal, Piron and Green-Lauks; coke-oven tar; gas-works tar; water-gas tar, and lignite tar from the Bureau of Mines carbonizing oven. Specific gravities will be determined and Barrett analyses made on the fractions. In this way a table of comparisons will be obtained, giving information, especially with regard to motor fuel production.

Use of Asbestine With Latex Gives Superior Product

Long-Fibered Magnesium Silicate Found to Be Satisfactory Filler for Rubber Goods Made by New Method

By Rudolph Ditmar

Translated from the original manuscript by Julian F. Smith, B. F. Goodrich Co., Akron, Ohio

IN THE search for suitable fillers to be used in the new process of making rubber and gutta percha articles direct from the sap of plants that yield the rubber hydrocarbon, asbestine was tried. This mineral has lately been mined in quantity at Burgenland, analyzing as follows: Silica, 49.81 per cent; alumina, 2.19 per cent; ferric oxide, 2.80 per cent; magnesia, 27.96 per cent; calcium oxide, 13.21 per cent; water, 3.91 per cent; manganous oxide, traces.

It is somewhat remarkable that asbestine is being used as a filler by the European rubber industry to only a slight extent. This is probably due to the fact that up to the present time a prime quality has only rarely been placed on the market. The situation is different in America. There the great value of asbestine as a rubber filler was long ago recognized in a practical way, and good use was made of its applications to the rubber industry. As early as 1899 Henry C. Pearson ("Crude Rubber and Compounding Ingredients, a Textbook of Rubber Manufacture," p. 62) wrote:

> Asbestine—A pure fibrous silicate of magnesia, called also mineral pulp. It is mined near Gouverneur, N. Y., where is the only deposit at present known in which magnesia shows so distinct a fiber. It is very largely used in the manufacture of paper, and also as an ingredient in rubber. Apparently the pulverized mineral is a very strong white powder, but in actual use it has not much more covering quality than whiting. It was at one time used largely in the manufacture of rubber shoes, but, aside from being inert and a good filler, was probably no better than whiting, while it was more costly. It is often used in white goods in connection with oxide of zinc to make a lightweight compound. It is also known as agalite and asbestine pulp. Its composition is: Silica 62, magnesia 33, water 4, iron oxide and alumina 1.

Old Filler Theory No Longer Holds

Pearson's brief discussion of asbestine cannot be wholly accepted now. He describes asbestine as being in general an inert material (filler). That is not strictly true. Since colloid chemistry has invaded the rubber industry, there is no longer any such thing as an inert filler; if there were, it would make no difference if, for example, powdered glass or an equal amount of kieselguhr were added to a rubber batch. Everyone skilled in the art knows that these two ingredients would lead to entirely different results. The reason for this is the difference in structure of different fillers. The explanation was reserved for colloid chemistry, although the fact had long been known among practical men.

Thus it is necessary to examine rubber fillers both from the chemical standpoint and from that of colloid chemistry. Only then is an adequate picture of the material obtained. Chemically, asbestine is an inert addition to rubber batches; in its colloidal chemical behavior, it is not. In order to understand this, it is necessary to have clear ideas. What is asbestine? What is talc? What is asbestos? Chemically, all three are magnesium silicates; colloidally—that is, as rubber

fillers—all three show fundamentally different behavior. This is due to the entirely different structural characters of the three magnesium silicates. Talc is made up of flaky scales with a fatty feel and a pearly luster; asbestos consists of long, glassy, fibrous elastic threads with a silky luster (differing widely, however, among different varieties of asbestos). Asbestine, on the other hand, consists of short, soft, flexible and elastic needles (threads) with a silky luster and a fatty feel.

In other respects the physical properties of asbestine are intermediate between those of asbestos and talc, and this is responsible for the quite typical qualities, possessed neither by asbestos nor by talc, that make asbestine so valuable in the rubber industry. From the standpoint of rubber technology, asbestine can probably be best defined as follows: "Asbestine is a short-fibered, soft, flexible and elastic magnesium silicate which is chemically inert and has a silky luster and a fatty feel; its physical properties partly resemble those of asbestos and partly those of talc."

Asbestine Used in Old Process

Asbestine is added to those rubber compounds in which an internal felting between the filler and the rubber is desired, which cannot be attained with talc. There are not many white fillers available to the rubber industry. Zinc oxide is very heavy and expensive; and it will not felt. Neither will magnesia, alumina or barium sulphate. Moreover, zinc oxide, barium sulphate, alumina and magnesia are all heavier than asbestine; only whiting is approximately equivalent to it in specific gravity, but whiting also is a filler that will not felt. Therefore asbestine is particularly suitable for light compounds for white goods. As is well known, the milling of crude rubber during compounding destroys the reticular structure (protein network) that is so important for the strength of the goods. If asbestine is added to the compound, however, it gives a renewed felting of the rubber, or what might be called a substitute for the protein network, which restores to the goods the strength lost by the dispersion and breaking up of this structure on the mill. For this reason it may be considered advisable, in order to strengthen the goods, to add a little asbestine (2 to 3 per cent) to all rubber compounds. Thus there would always be a felting effect. Such an addition would never do any harm, because asbestine is chemically inert.

Resembles Colloidal Silica

Plasticizing rubber on the mill makes it soft and plastic, or in a manner of speaking liquefies the rubber (even if not in the literal meaning of the term). In this condition the rubber hydrocarbon is adsorbed by colloidal silica. This phenomenon is of the utmost importance in the manufacture of automobile tires. In modern practice every effort is bent toward reducing internal friction in the tire carcass as much as possible. This is the reason, for example, that latex-impregnated threads, twisted into cords and laid parallel without weft (only warp), are used as a base in cord tires. The action of asbestine is comparable to that of the threads to the extent that the adsorption of rubber forms an "asbestine rubber" that no longer causes friction in the mixture, as does amorphous, non-colloidal silica. Asbestine added to a tread compound acts like gristle in flesh—that is, without friction and yet with a stiffening and felting effect. Asbestine has the same importance for cable compounds, solid rubber, factice eraser rubber, mats, hose (and syringe compounds), wringer rolls, etc. For cheap goods, of course, powdered crude asbestine (containing iron) would be used instead of refined snowflake asbestine. As magnesium silicate, asbestine is acid fast, and so is suitable in compounds for acid hose and storage battery jars.

Use of Asbestine in the New Process

It has already been mentioned that asbestine, as colloidal magnesium silicate, adsorbs the softened and plasticized rubber hydrocarbon and forms a colloidal adsorption of rubber and magnesium silicate. What happens with plasticized rubber of course occurs to a much greater extent with latex and asbestine; the colloidal silica has a very great adsorption capacity for latex, so that water is given off and the coagulating rubber forms a soft elastic adsorption compound with the asbestine. Many different colloidal substances have been tried in this method of making rubber goods direct from latex; colloidal cement and colloidal gypsum (also the best kieselguhr) were used in different formulas. No filler was found, however, that was so suitable as asbestine or gave such excellent results in the new process. The properties that make it useful in the old process are carried over into the new in much greater degree. The asbestine takes up the latex, and after adsorption and coagulation it mats the rubber, which no other filler does so thoroughly.

Thus, for example, asbestine in the new process for making tear-resistant, waterproof latex paper and latex linoleum not only materially cheapens the operation but by the felting effect it actually improves the quality of the product. By reason of the same properties asbestine also gives excellent results in the manufacture of cork board and of elastic inner soles for shoes from cork powder and latex by the new process. This filler is contributing essential results in the further development of the new process of making rubber goods direct from latex.

Utilizing Waste in Paper Making

In last week's issue of *Chem. & Met.* it was stated that J. F. Clerc, author of the article on the Devains process for utilizing waste fibers in paper making, was connected with the American Voith Contact Co. It was not implied thereby that this concern was connected in any way with developing this process. The contribution was entirely a personal one.

Bowie-Gavin Process May Handle Oil-Soaked Minerals

Much interest continues to be manifested in the possibility of the adoption of the Bowie-Gavin cracking process, developed by Interior Department engineers at the San Francisco office of the Bureau of Mines, to the simultaneous recovery and cracking of oil from oil-soaked sands and shales. A number of people having interests in the oil-soaked sand deposits of California or Canada have called at the San Francisco office to look the plant over and discuss its operation. Should the flush production in California and elsewhere decline, as many oil operators believe that it will, it is apparent that much interest will again be taken in the possibilities of marketing oils that may be extracted from such deposits. A report on the revitalization of inert material from the Bowie-Gavin process is being prepared by J. S. Desmond, chemist, Bureau of Mines.

Equipment News

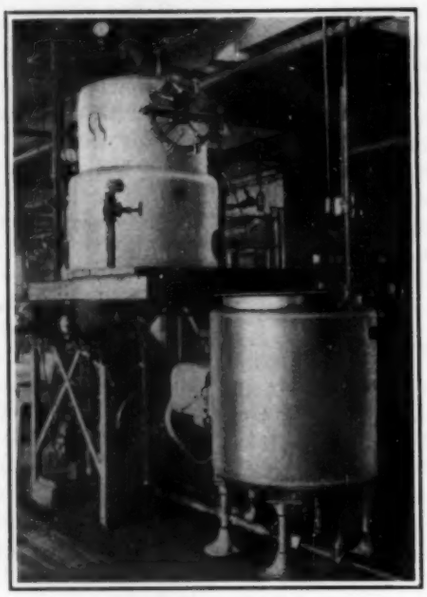
From Maker and User

Vacuum Equipment for Food Processing

By George F. Kroha
The Pfaudler Co., Rochester, N. Y.

During the last year many concerns have adopted glass-lined vacuum equipment for their food product processing. This is a significant fact, inasmuch as it indicates the growing confidence of the American canner in the vacuum method. European food product interests have been using this method for some time, particularly in Italy, where the preserving of tomatoes by this method has become a large industry. However, the average American canner has preferred to wait for American equipment to be available before taking up this system of operation, rather than to depend upon European equipment manufacturers for his apparatus. For this reason the method has been used by few in this country, but those that have used it have turned out a superior product in almost every case.

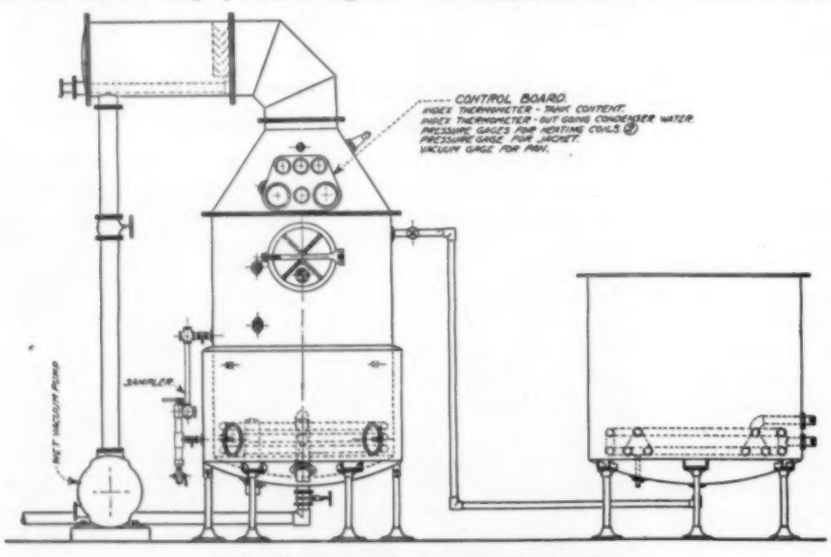
A line of this equipment has recently been placed on the market by the Pfaudler Co., Rochester, N. Y. In designing this equipment every precaution has been taken to eliminate the troubles experienced in the operation of the few vacuum pans that were used on this side of the water. For example, some of the pans were built too low so that when the product boiled it very often boiled out through the vapor outlet at the top. This has been rectified by building the new line higher. Also, most of the pans operated previous to 1923 were equipped merely with a jacket for heating. While this was suitable for certain products it did not meet the requirements of all. This was because with some the time taken to heat up thoroughly was too great.



Vacuum Pan for Preserves
Showing installation for crushed fruit products at the Weideman Co., Cleveland, O.

This has been taken care of by equipping the pans with special heating coils, which while they shorten considerably the period of cooking do not cause any burning on or caramelization of the product processed..

Two types of pans have been produced. First is the pan for the manufacture of tomato puree, tomato ketchup, tomato paste, for the concentration of pumpkin, fresh strawberries and raspberries and for use in other similar processes. This pan is usually built in an actual capacity of 1,000 gal., the working capacity being 500 gal. It has an inside diameter of 60 in. and a vertical height of 78 in. It is designed with a cone top, which facilitates the removal of the vapors in the concentration process. A pan with a smaller opening and a curved top tends to choke itself in operation. This equipment is shown in the accompanying line drawing. The curved top pan is, however, good equipment for certain processes.



Outline Layout of Conical Top Vacuum Pan

This conical top pan is equipped with a heating jacket, heating coil and propeller agitator. Among the accessories provided are observation glasses with cleaning devices incorporated, vacuum and steam gages, thermometer, sampler, vacuum brake and steam trap. This type of pan was operated during the last tomato-packing season at the plant of the Tecumseh Packing Co., where the maker had a test installation. One of the most interesting facts brought out in this test was that the tomatoes retained their original color after processing. The original flavor was also retained. These same results were also obtained at the plant of the Riverbank Canning Co., Riverbank, Calif., where two 1,500-gal. pans were installed.

Samples of tomato paste processed in the pans at the Riverbank Canning Co. were exhibited at the National Canners' show at Buffalo last month and had the effect of eliciting considerable comment on the basis of color. Suggestions were made that possibly this product had been colored with pimentoes. Actually nothing but the original tomato product was present in the paste. The color bases itself entirely on the fact that none of the primary solid contents of the tomato are heated enough to upset their natural physical condition—in other words, to cause the slightest caramelization or burning on. Thus nothing detracted from the color. In so far as flavors are concerned, there naturally was no metallic contamination, since the pan was glass lined. To help matters further a glass-lined preheater was used.

Curved Top Pan

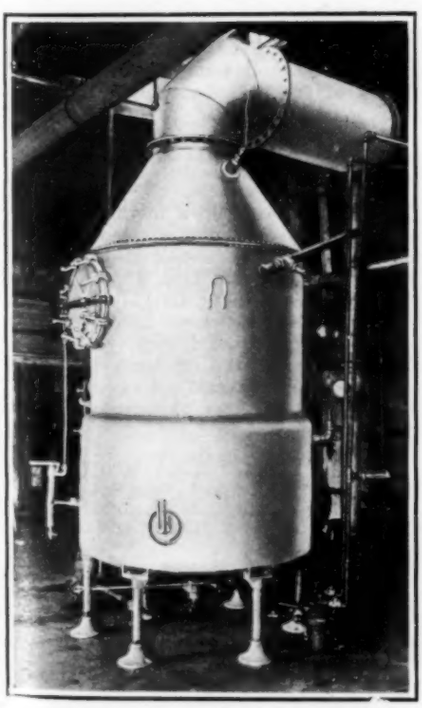
Inasmuch as most of the glassware in which marmalades, preserves, crushed fruits, etc., are packed is made in the East, whereas a large percentage of the fruit products are raised in the West, it has been considered impractical and expensive to ship the glassware West, pack the product at that point and then reship the pack East, where the large consuming centers are located. Freight rates prohibit. To meet this situation and at the same time take care of the year-around packer, the practice of shipping the cold-pack product in barrels has grown considerably in the past few years. To take care of concerns which would not require the capacity of the larger vacuum pan previously discussed, a smaller unit of 100 gal. working capacity has been developed.

An example of this type of pan is the installation at the Weideman Co., Cleveland. At this plant the barrels in which the cold-pack product has been delivered are taken from the refrigerating room, the heads removed and the product left to thaw. Then a hose is connected to the inlet of the vacuum pan and is inserted in the barrel, in which a certain amount of separation has taken place, the berries rising to the top. The sirup from the berries is drawn into the pan and concentrated. In the meantime the fruit remaining in the barrel is dumped into the preheater and with the agitator running is brought up to a temperature of about 180 deg. F., which causes a further separation of the sirup and fruit, the former being also turned into the pan. This sirup is then concentrated to the desired consistency and is remixed with the fruit in the preheater. The whole mix is returned for the third time to the pan, where the vacuum removes the air from the product, causing the cells in the fruit to expand. This gives it a plump appearance, increasing its size. From the pan the product goes directly to the bottling department, where it is placed in glass jars.

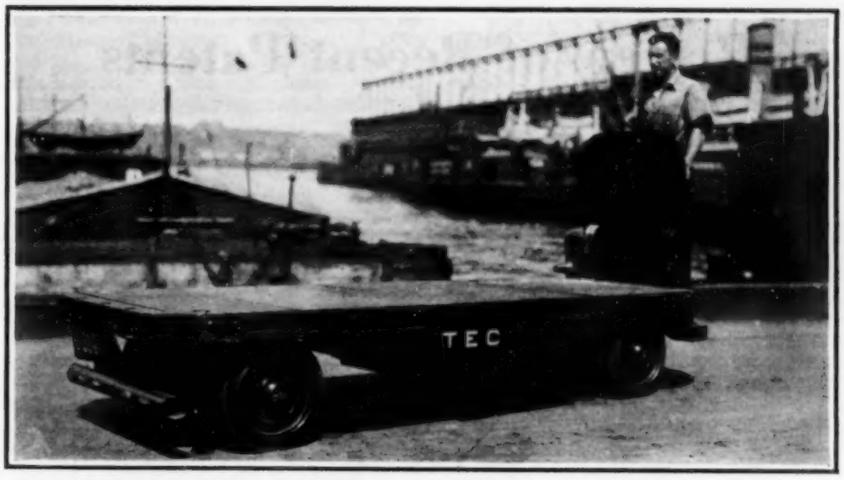
The handling of crushed fruits, maple sirup and other products is conducted in a somewhat similar fashion. It is noted that the pan used here has no heating coils nor is there a conical top. The latter is unnecessary, because the diameter of the pan is not great enough to cause stopping of the vapors. They are able to pass out very easily through the opening provided.

No Surplus Sirup

One of the features that will be of great interest to the packer of fruit products is the fact that there is no surplus sirup to be disposed of in handling fruit products by the vacuum method. At the same time a larger number of jars of product can be produced from a given batch. In this connection the following actual comparison made by the Weideman company in processing both by the open cooking and the vacuum methods are worth noting. In handling preserves by the open cooking method a 50-gal. barrel of product gave forty-two ½-gal. jars of product with a surplus of 9 gal. of sirup; the vacuum method produced sixty-two ½-gal. jars of product and no surplus sirup. Handling crushed pineapple by the open cooking method it was found that 410 lb. of the product and 225 lb. of sugar gave seventy-six ½-gal. jars of product with a surplus of 16 gal. of sirup, as compared to ninety jars of product and no surplus sirup under the vacuum method. These figures are indicative of the possible savings which may be accomplished through the use of the vacuum method.



Vacuum Pan for Tomato Products
Showing installation at Tecumseh Packing Co., Vincennes, Indiana.



Long Wheel Base Load Truck

Long Wheel Base Storage Battery Truck

As an Efficient Means of Handling Bulky Packaged Goods This Truck Holds Possibilities

A long wheel base truck has been added to the line of the Terminal Engineering Co., Inc., 17 West 44th St., New York City. The truck will carry 5,000 lb. and is intended for full load capacity of bulkier goods than could be placed on the shorter wheel base model, due to greater load-carrying area.

This truck is provided with drive and handling features identical with those of the shorter model. It has four-wheel drive, each wheel being provided with a vehicle type motor inclosed in a weatherproof case. Steering is accomplished with all four wheels, making possible, it is claimed, a much shorter turning radius than might be expected from a truck of this length, having a wheel base of 91 in. The driver's hands are entirely within the outer edge of the truck, thereby protecting them against injury.

The truck is carried on four full leaf springs and wheels with solid rubber tires 20x5 in. Brakes of the internal expanding type are ordinarily provided on two of the wheel units. The other two wheels, as all wheels are alike in general construction, may be provided with brakes if desired, although it is considered unnecessary by the manufacturer. Large wheels, individual drive and springs are intended to permit use of the truck without construction of special runways, it being able to traverse cinder fill, snow and ice.

The truck is designed to use separable bodies, driving under them as they stand on legs, and picking up by means of four screw jacks operated by a motor of the same frame and characteristics as those used on the wheels. It is claimed these jacks will elevate the loaded body clear of the ground in 5 seconds to full height of 9½ in., though the load may be carried in a partly raised position if desired. Provision is made for slippage at top and bottom of jack stroke to avoid jamming.

The machine is furnished with a spring drawhead, so that it may be used as a tractor if occasion requires. Having the entire weight on driving wheels, the tractive effort is sufficient to move very heavy loads, such as spotting freight cars and hauling large machines, castings, etc., on trailers. The coupler is automatic, with release from the operator's position, intended to save time usually lost due to hand coupling.

Protected head and tail lights are provided at each end, so that the truck may be used in close quarters indoors where the light is dim.

Catalogs Received

Heat-Treating Equipment Co., 79 Milk St., Boston, Mass. — A leaflet describing "Sentinel" pyrometers, tubes, paste and other temperature-determining products made by the Amalgams Co., Ltd., of England.

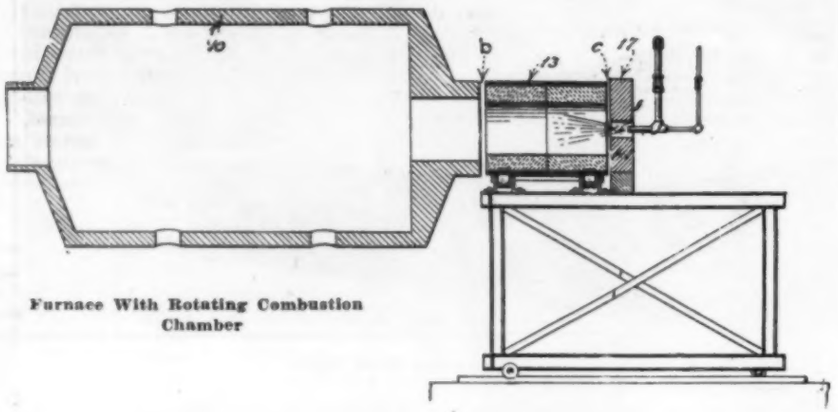
Norton Co., Worcester, Mass.—The first issue of a bulletin called "Norton Floors," which gives information on the use of alundum for floor tiles and stair treads.

Steere Engineering Co., Detroit, Mich.—Pamphlet 257. A leaflet on the "Doherty" type washer cooler.

West Virginia Pulp & Paper Co., represented by Allen Ashley, 152 West 42nd St., New York City.—Catalog of surplus paper mill equipment offered for sale.

Crescent Belt Fastener Co., 247 Park Ave., New York.—A chart in card form covering means and methods for joining belts. On the reverse side prices of the various equipment mentioned are given.

Review of Recent Patents



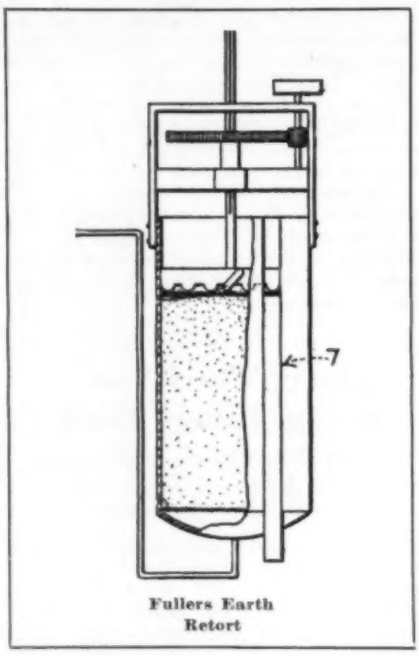
Furnace With Rotating Combustion Chamber

Suggestions on Furnace Design

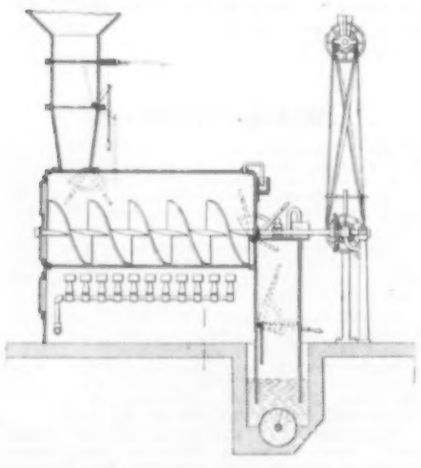
Chemical Furnace With Novel Combustion Chamber, Lithopone Calciner, Fullers Earth Revivifying Retort and Electric Non-Ferrous Melting Furnace Described in Recent Inventions

MANY types of furnaces are required in chemical plants, and operating conditions are frequently such as to present perplexing problems in maintaining satisfactory furnace life.

A rotating, reversible combustion chamber for rotary furnaces is proposed by Frank M. Allen, of Claymont, Del., as a means of overcoming troubles that have been experienced with such furnaces. As shown in the accompanying illustration (taken from Patent 1,480,361, Jan. 8, 1924, assigned to General Chemical Co.), the combustion chamber 13 is in the form of a cylinder mounted separately from the rotary furnace 10. The chamber can be rotated so as to compensate for roof wear and can also be reversed end for end if one part is found to wear faster than the other. Secondary air for combustion enters through the space *c* between the chamber and the backwall 17, and through space *b* between the chamber and furnace. Entering in this manner, the air forms a cool layer between the flame and the lining, thus protecting the latter. The life of such a combustion chamber is at least four times that of a stationary type.



Fullers Earth Retort



Muffle Furnace for Lithopone

Calcining Lithopone

An improved apparatus for calcining lithopone has been described by John T. Mitchell, of Greenwich, Conn. (1,478,347, Dec. 18, 1923.) In the manufacture of lithopone it has been customary to fill pans with the dry precipitate of barium sulphate and zinc sulphide and then to place the filled pans in a muffle furnace for a predetermined time to calcine the precipitate, after which the pans are withdrawn and the calcined product is quenched in cold water. During the removal of the pans, with the calcined product therein, through an open door of the furnace, the hot contents of the pans are subjected to atmospheric air, and a considerable amount of the zinc sulphide is changed into zinc oxide, which is very objectionable as an ingredient of lithopone, as it tends to reduce the density of the lithopone.

As shown by the accompanying illustration, the apparatus consists essentially of: a muffle furnace containing a screw conveyor; an airtight charging hopper; means for discharging and quenching the calcined product without coming in contact with air. In operation, the dried and pulverized precipitate of barium sulphate and zinc sulphide is charged into the muffle and heated for about half an hour at 700 to 950 deg. C. During this time the material is kept in motion by the screw, which automatically reverses its motion at predetermined intervals, thus moving the material back and forth over the heated surface. The calcined material is then discharged through a door into the quenching chamber, which is also provided with a screw conveyor to discharge the quenched product.

Fullers Earth Revivifying Furnace

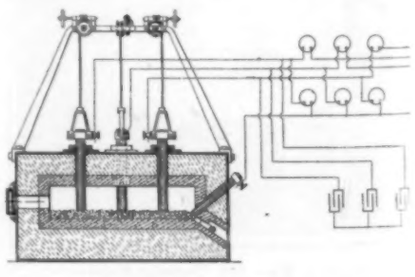
John R. McConnell, of Warren, Pa., has discovered that fullers earth or clay that has been used in filtering oil can be revivified by the combustion of the carbonaceous material which it has adsorbed. (1,479,998; Jan. 8, 1924.)

One form of apparatus is shown in the accompanying figure. The retort is provided with a device for stirring the surface of the clay in the retort; a sliding door 7 for removing the revivified clay. Suction is applied through the tube in the bottom and the clay is ignited by applying a flame until the entire surface becomes red. Combustion is then self-supporting and the rate may be regulated by the suction applied. It is claimed that this controlled burning results in an evenly burned clay and tends to prevent the fusion of the clay and the consequent closing of the pores.

Electric Brass Melting

Morris H. Bennett, of Waterbury, Conn., has developed a method for increasing the efficiency of electric furnaces designed to melt non-ferrous metals. (1,478,375; Dec. 25, 1923; assigned to Scovill Mfg. Co.)

For electric furnaces in which the current is conducted directly from electrode to charge, the efficiency is determined by the amount of energy that can be delivered to the charge in a given time. In furnaces for melting



Electric Brass Furnace

metals having a high electrical conductivity and low resistance, and particularly such metals as tend to give off fumes in melting, this limitation is serious because, if it be attempted to force a large quantity of energy into the furnace in a short time, excessive temperatures are produced beneath and immediately around the electrodes, the result of which is a tendency to burn the metal or cause excessive fumes, or both. Further, the high temperatures immediately beneath or around the electrodes and the heat that is radiated from the electrodes or from the zone between electrode and charge raise the temperature in the furnace chamber to such an extent that such fumes as are given off produce excessive pressures in the furnace chamber, particularly if it be of the closed type.

In such furnaces, furthermore, the effective current heretofore employed has been of low frequency—that is, approximately between fifteen and sixty cycles. This low frequency current, particularly where the charge is composed of metals having a high electrical conductivity, is, as is well known, so distributed through the charge that its resulting heating effect in the charge is comparatively low.

Instead of attempting to increase the heating effect by increasing the rate at which energy is supplied, Mr. Bennett finds that the same result can be obtained by increasing the frequency. This develops the desired heat right in the charge without producing the undesirable effects outlined above.

As the use of high-frequency generators presents many difficulties, condensers are used in connection with the usual low-frequency generator, Y-type connections being used as shown in the accompanying figure.

Actual commercial test of the apparatus which has been described, using a low-frequency generator delivering a current of about sixty cycles and employing three condensers having a capacity of about 3,200 microfarads each, has shown that a much higher temperature can be obtained and maintained in the metal, and consequently better heating, without undue production of fumes, than with the same apparatus without the condensers. This, of course, is highly advantageous where metals are being melted, the pouring temperature of which is necessarily considerably above the vaporizing point. The heating effect in the charge is increased without increasing the temperature in the furnace above the charge, so that such fumes as are given off are more readily condensed by the walls of the furnace chamber, the valuable metallic constituents being thus returned.

American Patents Issued February 12, 1924

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests, and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,483,084—Manufacture of N-Sulphato-Alkyl Compounds. Arthur George Green and Kenneth Herbert Saunders, Manchester, England, assignors to British Dyestuffs Corporation, Ltd., Manchester, England.

1,483,087—Ammonium-Nitrate Explosive. Roy Linden Hill, Tamaqua, Pa., assignor to Atlas Powder Co., Wilmington, Del.

1,483,107—Agitator for Use in Bleaching Flour. Burton Neal, St. Louis, and George H. Heberbrand, Kinloch, Mo.

1,483,111—Filter. William T. Price, deceased, late of Easton, Pa.; by Helen C. Price, executrix, Easton, Pa., assignor to Price Engine Corporation, New York.

1,483,115—Impeller for Flotation Machines. Charles E. Rock, Douglas, Ariz., and August Sandberg, New York, N. Y., assignors to William A. Butchart, Denver, Colo.

1,483,120—Coating Machine. Reinhold D. Schoenwetter, Baltimore, Md., assignor, by mesne assignments, to National Manufacturing Co., Baltimore, Md.

1,483,152—Process for the Production of Solutions of Volatile Oils. Jean Altwegg, Lyon, France, assignor to Société Chimique des Usines du Rhone, Paris, France.

1,483,155—Food Products and Manufacture Thereof. James Boyce, Holland, Mich., assignor to American Cotton Oil Co., New York.

1,483,160—Recovering Soda and Active Carbon. Maynard J. Creighton, Wilmington, Del., assignor to Darco Corporation, Wilmington.

1,483,187—Container for the Dry Cooling of Coke. Arnold Moetteli, Oberwinterthur, Switzerland.

1,483,194 — Evaporating Apparatus. Henry C. Petersen, Ste. Genevieve, Mo.

1,483,197 — Process for Producing Nitrogen-Containing Compounds. James H. Reid, Pittsburgh, Pa., assignor to International Nitrogen Co., Cleveland, Ohio.

1,483,212 — Vapor - Conservation System. Stephen H. Brooks, Muskogee, Okla., assignor to Oil Conservation Engineering Co., Cleveland.

1,483,221—Electric Induction Furnace. Otto Frick, Herserud, Sweden.

1,483,224—Putty Powder. Charles A. Hamel, Bakersfield, Calif.

1,483,228—Dust Separator. James A. McCullough, Fresno, Calif.

1,483,229 — Deodorizing Apparatus. Angus MacLachlan, Perth Amboy, N. J., assignor to Maclachlan Reduction Process Co., Inc., New York.

1,483,233—Process of Preparing Triphenylmethane Dyes. Joseph R. Minevitch, New York, N. Y., assignor to Dicks, David & Heller Co., New York.

1,483,241—Method and Apparatus for Granulating Liquid Slag. Emil Opderbeck, Gelsenkirchen, Germany.

1,483,256—Method of and Means for Chlorinating Fluids. James W. Van Meter. San Francisco, Calif., assignor to Justinian Caire Co.

1,483,266—Apparatus for Clarifying Liquids. Louis J. Archambault, Chicago, Ill.

1,483,298—New Alloy Comprising Iron, Nickel, Chromium, Molybdenum. Pierre Girin, Paris, France, assignor to Société Anonyme de Commentry, Fourchambault & Decazeville, Paris.

1,483,318—Composition for Treating Coal. Ralph H. Smith, Wilton, N. Y., assignor to William A. Robeson, Saratoga Springs, N. Y.

1,483,326—Centrifugal Machine. William Emil Bock, Eagle Point Colony, Ohio, assignor to Bock Laundry Machine Co., Toledo, Ohio.

1,483,327—Alloy Flux for Soldering Aluminum and Process for Forming Same. William G. Bolus, Rhinelander, Wis.

1,483,336—Method and Apparatus for Forming Glass. Robert M. Corl, Maumee, Ohio, assignor, by mesne assignments, to Erie Glass Co., Toledo.

1,483,348—Means for Cleaning and Drying Blast-Furnace Gas. John C. Hayes, Jr., and Harry L. Wetherbee, Chicago, Ill., assignors to Freyn, Brassert & Co., Chicago.

1,483,364—Porous Filter. William Martens, Ackley, Iowa.

1,483,368 — Manufacture of Resins. Vaikunth P. Mehta, New York, N. Y., assignor to Dhanpat Rai, New York.

1,483,371—Hydraulic Mineral Separator. Joseph B. Miller, Portland, Ore., assignor of one-half to Edwin Jacobson, Portland.

1,483,379—Air Filtering and Cleaning Device. William M. Reed, Louisville, Ky., assignor to William Reed Engineering Co., Louisville

1,483,397—Liquid Weigher. Walter E. Turner, Springfield, Ohio.

1,483,411—Process of Ammonia Synthesis and Means for Effecting the Same. John Collins Clancy, Providence, R. I., assignor to Nitrogen Corporation, Providence.

1,483,412 — Ammonia-Synthesis Catalyst. John Collins Clancy, Providence, R. I., assignor to Nitrogen Corporation.

1,483,413—Process for the Synthetic Production of Ammonia. John Collins Clancy, Providence, R. I., assignor to Nitrogen Corporation.

1,483,414—Process of Regenerating Ammonia Synthesis Catalysts. John Collins Clancy, Providence, R. I., assignor to Nitrogen Corporation.

1,483,415—Azo Dye. Heinrich Clingestein, Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen, near Cologne-on-the-Rhine, Germany.

1,483,424—Drier. Francis E. Finch, New York, N. Y., and Walter H. Glomb, York, Pa., assignors to Ruggles-Coles Engineering Co., York, Pa.

1,483,447—Azo Dyestuff. Johann Huismann, Wiesdorf, near Cologne-on-the-Rhine, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen, near Cologne-on-the-Rhine, Germany.

1,483,463—Making Bleaching Liquor and Apparatus Therefor. John R. MacMillan, La Salle, N. Y., assignor to Electro Bleaching Gas Co., New York.

1,483,468—Basic Refractory and Process of Making Same. Albert P. Meyer, Pittsburgh, Pa., assignor to Allen S. Davison Co., Pittsburgh, Pa.

1,483,469—Basic Refractory and Process of Making Same. Albert P. Meyer, Pittsburgh, Pa., assignor to Allen S. Davison Co., Pittsburgh.

1,483,484—Attachment for Separators. Leigh Rubert, Forestburg, S. Dak.

1,483,507 — Refractory Article and Method of Making the Same. Clarence J. Brockbank, Philadelphia, Pa., assignor to Ross-Tacony Crucible Co., Philadelphia, Pa.

1,483,554—Furnace and Dry Distillation of Waste Liquors and Similar Masses. Erik Ludwig Rinman, Djursholm, and Gunnar Fredrik Magnuson, Skoghall, near Karlstad, Sweden, assignors to Aktiebolaget Cellulosa, Stockholm, Sweden.

1,483,567—Process of Producing Tungsten Oxide From Tungsten Ores. Koji Anjow, Tokyo-Fu, Japan, assignor to Mitsubishi Kogyo Kabushiki Kaisha, Tokyo, Japan.

1,483,627—Process of Separating the Constituents of Mineral Silicates. John B. LaRue and Sherman W. Scofield, Cleveland, Ohio; said LaRue assignor to said Scofield.

1,483,738—Process of Making Highly Etherified Ethers of Cellulosic Bodies. Leon Lilienfeld, Vienna, Austria.

1,483,742—Method and Means for the Treatment of Fats and Oils. John Stevens Nicol, Putney, London, England, assignor to William Douglas & Sons, Ltd., London.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Book Reviews

Lead and Its Compounds

LEAD, ITS OCCURRENCE IN NATURE, THE MODES OF ITS EXTRACTION, ITS PROPERTIES AND USES, WITH SOME ACCOUNT OF ITS PRINCIPAL COMPOUNDS. By *J. A. Smythe, Ph.D., D.Sc.*, Reader in Chemistry, and *William Cochrane*, Lecturer in Metallurgy, Armstrong College, in the University of Durham, Newcastle-on-Tyne. 343 pages, illustrated. Longmans, Green & Co., London, New York. Price $5.25 net.

As the lead industry is, in so many phases, empirical, the author has endeavored rather to give a broad, critical survey of the problems encountered than to describe the processes involved with great detail, in the hope that the presentation of the problems will stimulate research.

A brief account is given of the history of lead, including ancient methods of mining, smelting and refining the metal, as well as the preparation and uses of litharge, red lead, white lead and lead sulphide.

A discussion of the occurrence of the important lead ores is followed by descriptions and examples of the methods of extraction of lead and the purification of crude bullion. Many of the older processes have been discussed, either because of their chemical interest or since they were forerunners of present methods. While the processes are described in some detail, very special emphasis has been placed upon the chemistry of the operations. An excellent chapter has been devoted to the reactions involved in roasting and smelting, which are dealt with in the light of the phase rule.

The softening and desilverizing of crude lead are well handled, although the chemistry of softening might have been allotted more space. It is interesting to note that the author accepts the solid solution explanation of the action of zinc in desilverization, whereas Hofman states that this is due to the formation of a definite zinc-silver compound. A description of the English and German methods of cupellation is preceded by a discussion of the physical chemistry of this operation. Electrolytic refining of lead is allotted a few pages, with a discussion of the reactions and conditions encountered. The recovery of lead fume by various old and present methods completes the treatment of lead refining.

The chapter on physical and chemical properties of lead contains information from widely scattered sources, some of which are not readily available. The values given for the density of lead at various temperatures should prove useful. The chemical properties and corrosion of lead and its alloys are treated quite thoroughly.

The manufacture of litharge, red lead, lead peroxide and white lead by standard methods is discussed from the chemical standpoint. Brief accounts are given of the common, and some uncommon, inorganic and organic salts of lead. A short chapter is devoted to the problem of lead poisoning.

Many of the practices described in the book are somewhat out of line with present American practice, but as the processes are described primarily to illustrate the chemical principle involved, this is not an objectionable feature. The volume is decidedly unusual in its method of treatment of the subject, and should prove quite useful to all who are interested in lead.

ROBERT H. YOUNG.

Science and Art of Electroplating

MODERN ELECTROPLATING. By *W. E. Hughes*. 160 pages, illustrated. Oxford University Press, New York. Price, $5.35.

No industrial development of electrometallurgical science has had a more profound influence on contemporary progress than the processes that rely on current from an external source for the deposition of one metal on another, termed electroplating, or, in so far as zinc is concerned, electrogalvanizing. The volume under review is a guide book for works chemists and engineers. Silver plating is not considered in detail, the author explaining that the process is not of prime importance from the engineering standpoint. Furthermore, the technology of silver plating has progressed not at all in the last 60 years.

With nickel, however, research and development has been active, and the use of the metal for plating purposes has increased considerably. Cobalt offers advantages over nickel, it is averred; the comparatively small use of the metal for plating purposes has been due, in the author's opinion, to lack of initiative, high pre-war cost and unfamiliarity. A large proportion of all the zinc produced is used for galvanizing; the deposition of the metal by electric current is a method that is preferred by some, although research is needed in the development of methods of application that will give uniformly satisfactory results.

Copper plating has increased in scope since the introduction of a method whereby a large variety of metal objects can be coated with copper, which is then sulphurized, giving an effect commonly referred to as "oxidized," relief and contrast being obtained subsequently by the removal of the sulphide coating in places. Iron plating was found during the war to be of considerable value in building up worn parts of airplanes and armament. Heat-treatment after deposition appears essential. Readers will recall a suggestive article on this subject, by the author of the book under review, in *Chem. & Met.* early in 1922.

The book opens with a general review, informative to those who have not specialized in the subject of electroplating, followed by a brief treatment of theoretical considerations. "Practice" is discussed under three headings: The preparation of the article, the deposition process and the finishing process. Then follow separate chapters on iron, nickel, zinc, lead, tin and chromium, and copper as plating metals. A chapter is devoted to a study of the structure of electrodeposited metal; another answers the question put to the author on many occasions: "What shall I read?" The recommendation is made that published matter that is more than 10 years old should be ignored, unless historical data are needed or unless research is planned and the work of others is to be studied. The author recommends that the latest literature be read in the first instance, then that the references quoted be followed up. We are reminded that it is a waste of time for anyone desiring information on electroplating to consult treatises on chemistry or physics; he should refer to books on physical chemistry, pure and applied, and technical works on the electrolysis of aqueous solutions. It is gratifying to note that the author recommends the reading of only four technical periodicals that cover the subject in the English language, one of which is *Chem. & Met.*

Students of the book will be struck with the vigor of presentation and the evidence of a critical and constructive attitude throughout. The desire to improve the technology of the art is evident. Readers are invited, in the foreword, to communicate their troubles to the author, who "will be only too willing to resolve doubts: he considers it a moral obligation to do so." An author does incur a moral responsibility of this nature; and technology would be on a firmer foundation if this obligation were recognized and if the average reader showed sufficient initiative to take advantage of the availability of expert advice, only a comparatively small part of which can ever appear in print.

A. W. ALLEN.

Important Articles in Current Literature

More that fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

ELECTRODEPOSITION OF RUBBER COATINGS. A method by which rubber coatings may be quickly, inexpensively and safely deposited and conditioned on articles having a conducting surface. *Rubber Age*, Feb. 10, 1924, pp. 338-9.

DRYING PAPER. *Ogden Minton.* A description with test data of a vacuum drying machine for paper. *Paper Trade Journal*, Feb. 14, 1924, pp. 53-59.

MANUFACTURING ENAMELED WARE UTENSILS. *Francis G. White.* Some points of importance to the manufacturer and the consumer. *Blast Furnace & Steel Plant.* February, 1924, pp. 124-126.

DRY CLEANING BLAST FURNACE GAS BY FILTRATION THROUGH FLUE DUST. *George B. Cramp. Blast Furnace & Steel Plant.* February, 1924, pp. 101-103.

NAPHTHALENE. *H. P. Lupton.* An unusually excellent review showing quantitatively the relation between naphthalene stoppages in gas distribution systems and temperature. Some of the physicochemical relations involved in napthalene removal from gas are also discussed. *Gas Journal* (London), Jan. 30, pp. 262-5.

News of the Industry

Summary of the Week

A.S.T.M. annual meeting plans nearing completion. Corrosion and metallic properties discussions to be featured.

Government loses appeal in suit against the Butterworth-Judson Corporation, which grew out of picric acid contract.

French chemical engineers reported to have formed syndicate for advancement of profession.

Prizes are offered employees of the Institute of American Meat Packers for ideas of value in production.

Divorce of industrial alcohol from present prohibition jurisdiction sought.

Southern Senators favor use of government funds for purchases of soda nitrate and calcium arsenate.

Fertilizer law of North Carolina is upheld in suit involving questions of quality.

Alvin Hunsicker Addresses Chemical Salesmen

A regular meeting of the Salesmen's Association of the American Chemical Industry was held last Tuesday evening at the Builders Exchange, New York City. After dinner had been served a brief business meeting was held, with President Dorland in charge. The question of limiting membership in the association was discussed, but no definite action was taken. R. T. Dunning and E. H. Bedell reported for the committee which had in charge the matter of arranging a lecture course in economics.

The principal speaker of the evening was Alvin Hunsicker, president of the Standard Textile Products Co. Mr. Hunsicker delivered a masterly address on the subject "The Invisible Force." Short addresses were given by John Boyer of the Mathieson Alkali Works and by F. L. McCartney of the Monsanto Chemical Works.

French Chemical Engineers Form Syndicate

The new Syndicat des Ingenieurs Chimistes Français has just enrolled its two thousandth member. The organization is a recent fusion of the Société des Chimistes Français and the Syndicat Professionel des Ingenieurs Chimistes Français. The two united groups have just held their first general meeting at the Conservatoire des Arts et Métiers under the presidency of M. Fleurent. Most of those engineers who are most prominent in the world of French chemistry were present.

The burden of the speeches made was to the effect that the chemical engineer was too often grouped with the mere chemical worker, or rather that the chemical worker, calling himself a chemist, was generally assumed to be a chemical engineer.

The president in closing the meeting stated that without any desire to instigate what he called a conflict of molecules in the industry, an act which would be little in keeping with the calm that was necessary for the advancement of their profession, he was of the mind that a strong professionally trained technical body was a necessity which imposed itself upon the industry the worth and importance of which to the well being and safety of the nation was so clearly demonstrated during the war. Corporative interests would be safeguarded and the rights of individual members protected.

German-British Dye Agreement Not Yet Consummated

Cablegrams reaching this country last week indicated that the proposed agreement between the German and British dye interests has not been consummated. The discussion of the matter has aroused great protest. At a conference in Manchester at which were represented the consumers of dyes, manufacturers of dyes other than those affiliated with the British Dyestuffs Corporation, dealers, chemists and government officials, the consensus of opinion was that the agreement will not be consummated.

New York State Would Prevent Pollution of Streams

The Male bill introduced last week in the New York State Legislature amends the conservation law by prohibiting pollution of any waters within the state with acids, refuse from factories, mineral oils or other substances injurious to water fowl, shellfish or fish. This is an attempt to solve by legislative prohibition the wholesale dumping of oil refuse into the waters of New York harbor and waters adjacent thereto, but at the same time affects half a dozen large chemical plants located on the inland waters of the state.

Meat Packers Announce Prize Contest for Ideas

Prizes aggregating $750 are offered employees of members of the Institute of American Meat Packers for ideas that may improve the processes used in the industry. Such ideas may include labor-saving devices in any operating department whereby one or more men are eliminated or whereby production is increased with the same labor outlay. Or the idea may be the statement of a simple idea by the adoption of which some packing house product may be handled in a different manner to increase its value or sale. Anything to improve the quality or desirability of any packing house product is sought.

Employees of the members of the Institute must submit a brief of their ideas by Aug. 15. The awards will be made by a competent committee who will carefully consider every suggestion made and will make the most thorough possible investigation of all improvements brought to their attention. Awards will be made at the time of the next convention (September, 1924).

S.C.I. Honors Leverhulme

The Society of Chemical Industry was left a substantial sum of money in 1921 by the late Dr. Rudolf Messel, F.R.S., the well-known British chemical manufacturer. To perpetuate his memory the council of the society decided to award biennially a medal, to be called the Messel medal, to an eminent man distinguished either in chemical science or in chemical industry who should be asked to deliver the Messel memorial lecture on the occasion of the annual meeting of the society. The first award was made in 1922 to Prof. Henry E. Armstrong, F.R.S., who delivered his lecture at the annual meeting in Glasgow. This year the council of the society has awarded the medal to the Viscount Leverhulme, the well-known leader in British industrial affairs and an old member of the society.

A.I.M.E. Meeting Featured by Howe Lecture

A most enthusiastic and successful meeting was held in New York City Feb. 18 to 21 by the American Institute of Mining and Metallurgical Engineers. In addition to the usual technical papers, the annual banquet, and a trip to the Bethlehem Steel Works, there were two features of particular importance: the annual lecture of the Institute of Metals by Zay Jeffries and the first Henry Marion Howe memorial lecture by Albert Sauveur.

Dr. Jeffries talked on "The Trend in the Science of Metals" and told of the progress that has been made in the investigation of the constitution of metals and the explanation of their properties. After presenting a comprehensive picture of the science in its present state, he described in more or less detail some of the work he and his colleagues are now undertaking.

In the Howe memorial lecture Dr. Sauveur described briefly but vividly his friend, the man in whose memory this series of lectures is presented. The salient points of this description will be found elsewhere in this issue of *Chem. & Met.* The main body of the lecture consisted of a description of some experiments that have been made at Harvard University under Dr. Sauveur's direction. These experiments showed beautifully the variations in plasticity of irons and mild steels at temperatures varying from below the critical points up to the usual forging temperatures.

Technical sessions were held on coal and coke, metallurgy, mining methods, industrial relations, non-ferrous metals, and iron and steel. They were attended by members interested in these particular subjects and provided opportunity for exchange of ideas of value in research work and industrial practice.

A typical research paper of considerable importance was that on "The Nature of Martensite," by Edgar C. Bain, and its discussion by Ancel St. John. The agreement of the results of these two independent workers was significant of the progress that is being made in this line of investigation. The paper on "Stainless Steel," by J. H. G. Monypenny, of Sheffield, England, read by Dr. Waterhouse, created such an extensive discussion that several of the papers that were to have been presented at that session were postponed until the following day. B. D. Saklatwalla and P. A. E. Armstrong were the principal participants in this discussion, which hinged largely about the question of the possibility of making rustless iron by the use of ferrochrome at a price low enough to make it widely applicable.

Canadian Concern to Make Glass

Glass and glassware of all kinds will be manufactured by the Canadian Auto & Art Glass Co., Ltd., capitalized at $100,000, with headquarters in Montreal. The principal incorporators are George F. Pese of Fuerth-Nuremburg, Germany, manufacturer; Gerald McTeigue, advocate; Charles E. Huston, accountant, and John Corcoran, engineer, all of the city of Montreal.

News in Brief

To Show American Dyes Do Not Fade—With the idea of giving ocular evidence that American-made dyes do not fade, the Chemical Division of the Department of Commerce will stage an exhibit at the Better Fabrics Exposition to be held in Providence, R. I., under the auspices of the laundry industry.

Canada to Make Fuel Compound—A new company plans to start operations shortly in Hamilton, Ont., known as the J. P. Porter Co., this concern is organized to manufacture a patent fuel from coal screenings and asphaltic fuel oil. A 5-acre site has been leased from the Canadian National Railway. From $100,000 to $150,000 will be spent on a plant which at the outset will give employment to forty to fifty hands. J. P. Porter, one of the contractors on the Welland Canal, and H. L. Ferry, of the Ferry Coal Co., Hamilton, are associated in the formation of the company.

Metal Corrosion Surveys Ready—The first three numbers of the mimeographed series of research information surveys on corrosion of metals, compiled by Harold F. Whittaker in the Research Information Service, dealing with nickel, aluminum and copper, are now obtainable, bound under one cover, from the Publications Office, National Research Council, 1701 Massachusetts Ave., Washington, D. C., for $2. As the edition is limited to 250 copies, those interested in this subject should send their orders accompanied by remittance without delay, as the stock is likely to be exhausted quickly.

Another Canadian Pulp Mill Projected—It has been announced that work will commence this year at Prince George, B. C., on a $10,000,000 pulp and paper plant. F. Jones, president of the Canada Cement Co., and Angus McLean, a prominent Eastern lumberman, are active in the matter and head the syndicate which will build the plant.

Patent Office Employees Making Lists Classified—The spare time of some of the employees in the U. S. Patent Office is being used now to make a card index of the 1,600,000 patents that have been issued, indicating the class and subclass to which each patent has been assigned. This will be placed in the search room and open to the public, thereby not only adding greatly to the public convenience but saving much time of the employees of the office, who must now furnish this information.

Will Close Marcus Hook Plant—The National Aniline & Chemical Co., Inc., is arranging for the closing of its plant at Marcus Hook, Pa., and will concentrate operations at its works at Buffalo, N. Y. It is expected to make the change on March 3, when it is believed unfinished work at the Marcus Hook plant will be completed.

Refractory Plant Reopens — The Lavino Refractories Co., Philadelphia, Pa., has resumed operations at its firebrick and refractory manufacturing plant near Womelsdorf, vicinity of Reading, Pa., which has been idle for some time past. It is purposed to develop production to a normal basis at an early date.

Oil Companies Will Consolidate—The Mutual Oil Co., Kansas City, Mo., has concluded negotiations for the purchase of the Continental Oil Co., Denver, Colo., with refining plant at Florence, Colo., and will consolidate the company under the Mutual company name, with combined capitalization of $30,000,000. The purchasing company is now operating refineries at Chanute, Kan.; and Cowley and Glen Rock, Wyo. S. H. Keoughan, Denver, has been elected president of the corporation.

Palm Nuts in Mexico—A comprehensive report on the palm-oil nut industry of Mexico has been received by the Department of Commerce from Vice-Consul Stephen E. Aguirre, Manzanillo, Mexico. This report covers the cultivation and production of palm nuts, labor conditions, taxes levied on the palm-nut production, commercial uses of coquito-nut oil, transportation facilities, freight rates and prices.

Drug Companies Cited—McKesson & Robbins, Inc., and Schieffelin & Co., and the Druggists' Circular, Inc., have been named by the Federal Trade Commission in complaint charging unfair trade methods. The firms were specifically charged with co-operating to suppress and eliminate competition in the sale and distribution of drugs and druggists' supplies.

Federated Malay States Change Regulations for Export of Rubber—In view of the increasing risk of forgery, rubber export coupons, license certificates and other documents authorizing the exportation of rubber from the Federated Malay States have been discontinued. Since Nov. 1, exporters, whether owners of certificates of standard production or dealers, have been required to register and will be credited with the amounts of rubber they may export and will be allowed to export against this credit until it is exhausted.

Gypsum Firm, American Controlled, in Nova Scotia—A company known as the Great Bras d'Or Gypsum Co., composed of American interests, has taken over a property at Little Narrows, N. S., formerly owned by the Eastern Gypsum Co, and is now at work developing the property with the intention of exporting gypsum. The company was formed by Freeman I. Davidson, a native of Windsor, N. S., and who is president of the concern. Mr. Davidson is also president of the Discount Co., a Massachusetts concern.

Anhydrite Study Urged by Gypsum Industry—Industries representing more than 90 per cent of the gypsum producers recently adopted a unanimous resolution urging the Interior Department, through the Bureau of Mines, to undertake work on the utilization of anhydrite. Some preparatory work along this line has been performed at the Non-Metallic Mineral Experiment Station of the Bureau of Mines, New Brunswick, N. J., and laboratory work will be begun in the near future.

Washington News

U. S. Funds Asked for Purchases of Nitrate and Arsenate

A revolving fund of $10,000,000 to be used by the President "to procure or aid in procuring such stocks of nitrate of soda and calcium arsenate as he may determine to be necessary and may find available for increasing agricultural production during the fiscal year to end June 30, 1925" is provided in a resolution that has been approved by the Senate Committee on Agriculture.

Southern Senators are determined to press this resolution, as they believe economies can be effected by large-scale purchases of nitrate of soda and because they believe the placing of large contracts for calcium arsenate will tend to stabilize the industry.

A similar measure failed of passage during the last Congress, when the situation with regard to these two commodities was more acute than is the case at present. For that reason, the prospects are that this bill also will fail. On the other hand, this is an election year. Relief for the farmers is getting sympathetic consideration, judging from the attitude of Congress toward other measures in the interest of agriculture.

Divorce of Industrial Alcohol From Prohibition Law Sought

At the request of Senator Bayard of Delaware, the statement and recommendations submitted on Oct. 20, 1923, to the Bureau of Internal Revenue by its alcohol trades advisory committee were made a Senate document on Feb. 13, 1924. Unanimous consent was given this recommendation. The official publication pamphlet will be entitled "Uses of Alcohol in Scientific Research and Lawful Industry" and will be known as Senate Document 44. Undoubtedly users of alcohol will be interested in securing copies of these pamphlets, which will be furnished without cost.

Since taking his seat, Senate Bayard has familiarized himself thoroughly with the importance of alcohol from the standpoint of science, industry and national welfare. He is in hearty accord with the recommendation of the alcohol trades advisory committee that the administration of the legitimate uses of this chemical should be divorced entirely from prohibition enforcement.

Specifications Work Progresses

Progress is being made by the Bureau of Standards in the preparation of the Dictionary of Specifications and about two-thirds of all the specifications received have been classified and index cards completed. Some very interesting data have been obtained from state purchasing agents concerning the amounts of money involved in the purchase of various classes of commodities. From the data already on hand it seems safe to state that 50 per cent of the money actually expended for commodities by the federal and state governments and public institutions is used in the purchase of food for human consumption and of feed and forage for animals. At the same time it is worth while noting that the portion of the classified index relating to food and kindred products contains less than 10 per cent of the estimated number of cards in the index as a whole. For these reasons it has seemed desirable to keep the cards relating to foods and similar products separate from the other cards in the index, a plan that has been followed without difficulty because relatively few organizations have issued specifications for foods.

Tear Gas as Weapon for Policemen

The accidental shooting of Senator Greene of New Hampshire, when revenue officers and bootleggers engaged in an exchange of pistol shots, has revived the suggestion that all police officers should be armed with tear gas rather than with firearms. In this connection, attention is called to the fact that great improvement has been made, even in recent months, in receptacles suited for the carrying and discharge of this gas. General Fries has on display at the Chemical Warfare Service an ingeniously constructed policeman's club that carries a cylinder of the gas. It is so arranged as to be effective at a distance of several yards. There are other containers that would be adapted to the work of the revenue agents, where a larger supply of the gas might be required.

Citation Against Soap Company

The Federal Trade Commission in a citation against James S. Kirk & Co. of Chicago charges the latter with misbranding some of its soap products. The complaint specifies that different brands of soap manufactured and offered for sale by the Kirk company are offered as castile soaps, whereas they do not contain any olive oil as is the case with genuine castile soap.

North Carolina Fertilizer Law Upheld in Suit

In a decision handed down Feb. 18, the United States Supreme Court sustained the validity of the North Carolina law of 1917 regulating commercial fertilizer within that state.

The case at issue was that of Richard M. Jones against the Union Guano Co. Jones sued for alleged loss in a tobacco crop through use of a fertilizer that he charged was inferior in quality. The trial court dismissed his suit on the ground that he had not complied with the state law offering the facilities of the state authorities for chemical analysis of fertilizer sent in by purchasers, this provision being one clause of the law regulating fertilizer sales. The plaintiff had at no time sought an analysis of the fertilizer of which he complained. The State Supreme Court sustained the lower court, and these decisions were upheld by the United States Supreme Court.

The case was regarded as a test of the North Carolina law, which was enacted by the Legislature after the Supreme Court of that state had warned that because of a multitude of suits against fertilizer companies there was danger that no company would undertake to do business in the state.

Alloy Work at Cornell Stops

The field office of the Bureau of Mines at Ithaca, N. Y., has been closed. In the future the alloy work that has been conducted at that office under the direction of Dr. H. W. Gillett will be pursued in Washington under a co-operative agreement with the Bureau of Standards. Dr. Gillett recently accepted the appointment as chief metallurgist of the Bureau of Standards to succeed G. K. Burgess, who now is director of the Bureau of Standards.

Dr. E. L. Mack has been assigned by the Bureau of Mines to work with Dr. Gillett, so that the Bureau of Mines may have full advantage of all work done on alloys and so that the work of the two bureaus on this subject may be conducted without duplication.

Lyon Presides at Conference on Furnace Refractories

The Bureau of Mines has under consideration the desirability of a survey and an investigation of the requirements that should be met in the refractories used in boiler settings in coal-fired furnaces and the qualities of refractories that may be used to advantage in connection with metallurgical operations. The matter was discussed at length at a conference on Feb. 16 in Washington, at which Dorsey A. Lyon, acting director of the Bureau of Mines, presided. No final determination has been reached. Others present at the conference were O. P. Hood, chief mechanical engineer of the Bureau of Mines; S. C. Lind, chief technologist of the Bureau of Mines; C. F. Hirschfeld, Detroit Edison Co.; Prof. A. E. White, University of Michigan; E. B. Rickets, New York Edison Co.; H. W. Gillett, chief metallurgist Bureau of Standards; E. B. Powell, Stone & Webster; G. A. Bole, superintendent ceramic station Bureau of Mines; C. E. Williams, superintendent Seattle Station Bureau of Mines.

Silver Salts Assessed on Dry Weight

The Court of Customs Appeals has reversed the decision of the Board of General Appraisers in the case of the Newport Co. against the United States on the question of assessing duty on silver salts. The issue in the case was whether a specific duty on the coal-tar product commonly known as silver salts should be assessed on the actual weight, nearly 60 per cent of which was water, or on the dry weight of the salt. The claim of the importers that duty should be assessed on the dry weight was sustained by the court.

A.S.T.M. Preparing for Atlantic City Meeting

June 23 to 27, 1924, to Be Big Week—Corrosion and Metallic Properties to Be Featured

The twenty-seventh annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, Atlantic City, N. J., during the week of June 23, 1924. It is probable that Monday, June 23, will be devoted to committee meetings, with the first session of the annual meeting on Tuesday morning and the closing session Friday evening, June 27. It will be necessary as in the past 2 years to hold two or more simultaneous sessions. A provisional program will be mailed to the members about the end of April.

Although it is too early to make a detailed announcement, the following topics are expected to figure prominently in the program. The discussion of the past 2 years on endurance tests of metals will be continued, especially as relating to hard alloy steels and hard-drawn brass and copper. Tests for corrosion of metals will assume a prominent place in the program and a symposium on corrosion-resistant, heat-resistant and electrical resistance alloys will be a big feature.

The discussion of last year on gases in steel has led to the tentative offer of a paper discussing the importance of this subject as applied to steel rails. The standard test bar for cast iron, particularly as it relates to cast-iron pipe and the effect thereon of the recently developed centrifugal method of casting pipe, will be an important topic. The field of cement and concrete will be well represented by reports and papers, the most notable item being the second report of the joint committee on standard specifications for concrete and reinforced concrete, including the results of laboratory and field tests that have been conducted by the joint committee to determine the practicability of certain of the recommendations in its first report.

In the field of testing, several of the committee reports will include important recommendations, notably that of committee E-1 on methods of testing relating to tests of metals. The broad question of classification of materials according to size is now engaging the attention of a number of the committees through the medium of committee E-1 and will have a place on the program. Papers on textile materials, rubber products and gypsum are expected to add interest to those divisions of the society's work. All indications point to one of the most successful and inspiring meetings in the society's history.

Large Stocks of Portland Cement

Stocks of finished portland cement in the United States for the month of January aggregated 14,153,000 bbl., compared with 10,575,000 bbl. last December, according to figures of the United States Geological Survey. Production for January amounted to 8,788,000 bbl., and shipments totaled 5,210,000 bbl.

Government Loses Appeal in Butterworth-Judson Case

Federal Judge Mayer in United States Circuit Court of Appeals on Feb. 18 affirmed the recent decision of Federal Judge A. N. Hand dismissing the government's accounting against the Butterworth-Judson Corporation and others. The litigation concerned an advance of $1,500,000 made by the government to the corporation on a contract let for 72,000,000 lb. of picric acid for use in the war.

This contract was automatically canceled with the signing of the armistice. Later Butterworth-Judson went into hands of receivers and the government entered suit, demanding return of the money advanced less the value of the picric acid which had been delivered.

Trade Notes

The fertilizer plant of Armour & Co. at Carteret, N. J., was destroyed by fire on Feb. 19. Loss is unofficially estimated at $150,000.

The export duty of 3d. per lb. on gum copal and £1 0s. 10d. per ton on palm oil shipped out of Sierra Leone has been abolished.

Edward D. Levy president of the International Products Co., which is the largest producer of quebracho in South America, reached New York last week.

Export duty on shipments of linseed from the Argentine during February is 3.39 gold pesos per metric ton, as compared with 4.50 gold pesos previously in effect.

A voluntary petition in bankruptcy was filed on Feb. 15 by the Holyoke Plush Co., manufacturer, of Holyoke, Mass. According to the petition the company has liabilities of $305,364 and assets of $164,710.

A company has been formed with a capital of $500,000 to develop soapstone deposits near Dryden, Ont.

A report from Commerical Attaché Julean Arnold at Peking states that the quantity of tung oil that will be available for export from the 1923 production is placed at approximately 40,000 tons. Stocks on hand in Hankow at the end of 1923 were estimated as at least 1,000 tons. Shipments and internal movements of the oil are slow, because of the disturbed political conditions and the commandeering of coolie carriers. In addition, navigation is very difficult on account of the lowness of the water in the rivers.

David G. Garrabrant, senior partner of Bulkley, Dunton & Co., paper manufacturers, with offices in New York City, died at his home in Bloomfield, N. J., on Feb. 18.

The Gulf States Chemical & Refining Co. is planning to operate a calcium arsenate plant at Montgomery, Ala.

Chemical Industry Progresses in Poland

A report on the condition of the chemical industry of Poland was recently made by L. J. Cochrane. He stated that the Polish chemical industry at present has 14,600 workmen in 130 factories. Of these factories ten produce superphosphates. During the first 3 months of 1923 four bone factories produced 1,317 tons of bone flour, 97 tons of tallow, 410 tons of glue and 543 tons of superphosphates.

During the second half of 1922 the azote factory at Chorzow manufactured 23,132 tons of calcium cyanide, of which 10,104 tons was consumed locally and the rest was exported, mostly to France, Belgium and Holland. Factories at Grodzisk, Srodula and Salvarsan manufactured during 1922 more than 1,400 tons of methyl alcohol, nitric acid, acetic acid, formaldehyde, chloroform, acetone, various oils, ketone, salicylic acid, glauber salts, hydrochloric acid and neosalvarsan.

Two soda factories, employing about 1,000 workers, during the first 3 months of 1923 produced 11,790 tons of sal soda and 1,710 tons of caustic soda. Two other factories during the same period produced 70 tons of borax. This is one-fourth of the pre-war output.

One factory, devoted to the dry distillation of wood and employing 230 workmen, produced 110 tons of acetate of aluminum, 60 tons of pitch, 760 tons of charcoal and 10 tons of methanol.

In the electrochemical branch, employing 400 workmen, production during the first 3 months of 1923 included 300 tons of carburet of calcium, 80 tons of potassium chlorate, 446 tons of aluminum chloride and 137 tons of caustic soda.

The artificial silk factory in Tomaszow, having about 3,200 employees, in January and February produced more than 71 tons of silk, of which 10 tons was "viscose" and 61 tons collodion silk.

About 45 glass factories are active at present. These employ 9,300 workmen and produce about 72,000 tons of glass annually. Exports amounting to 829 tons annually consist principally of small glassware.

Heat Transfer Research Sought

Awards of prizes to mechanical engineering students in the field of furnaces and heat transfer apparatus are announced by Prof. Charles E. Lucke of the Columbia University Schools of Mines, Engineering and Chemistry.

The competition, Professor Lucke said, was significant of the vast economic importance of this sphere, which has not yet undergone the rigorous investigations of engineering and scientific research. The National Research Council has taken up the whole question of heat transmission, and the report of a special committee, just completed, urges the formation of a working organization to encourage and co-ordinate national activity and to foster research. An expenditure of $10,000 to carry out a bibliography program is urged.

Gas and Fuel Section of A.C.S. Perfecting Washington Plans

The Gas and Fuel Section of the A.C.S. has plans projected for the Washington meeting April 21 to 25. A round-table discussion of spontaneous combustion of coal, likewise of coal constitution and classification, is on the program. Two papers are already assured, one on "Modern Research in Fuels" and another on "A Study of Resins in Western Coal." Members are urged to come prepared to present their views freely, to the end that the discussion constitute a real contribution to the work of the section.

Those that contemplate presenting papers at this meeting should send the secretary, J. D. Davis, 4800 Forbes St., Pittsburgh, Pa., a 100-word abstract as soon as possible; since the program will not include as many papers as heretofore, the rule "first come first served" will prevail in acceptance of papers should there be more offered than the time for presentation will allow.

Baltimore Would Prevent Wastes

The refuse of Baltimore may be salvaged if proposals for the necessary plants are favorably received. According to information received from Steuart Purcell, chief engineer, Department of Public Improvements of Baltimore, the two salvaging plants will be substituted for five incinerating plants without salvaging features that had been previously proposed. Mr. Purcell states that the decision to make this change was the result primarily of the successful operation of the refuse-salvaging plant at Washington, D. C., where "tin cans, bottles, scrap metal, etc., which are difficult to dispose of by incineration," he observed, "could be salvaged and sold at a profit."

Colloid Lab Proposed

The colloid committee of the National Research Council has announced its intention to back a proposal that has been made for the establishment of a laboratory to be devoted to the problems of colloid chemistry. Dr. Harry N. Holmes, Oberlin College, chairman of the committee, and Prof. J. M. Mathews, University of Wisconsin, with whom the proposal originated, are active in developing plans for the project.

Graduated Tax on Exports of Olive Oil From Spain

According to a Spanish royal order, which went into effect on Feb. 11, a graduated export tax will be levied on shipments of olive oil from Spain. The amount of tax will vary according as the average monthly price fluctuates at producing centers. When the average monthly price at factory is between 174 pesetas and 196 pesetas per 100 kilos, the export tax will be 10 pesetas per 100 kilos. From that level the tax will be graded up to a maximum of 50 pesetas per 100 kilos, whenever the average factory price is in excess of 260 pesetas per 100 kilos. The tax will apply to all grades of olive oil with an acidity of 4 per cent or less.

Financial

The Commercial Solvents Corporation for the year ended December reports net loss of $59,874, as compared with net profit of $156,989 in 1922.

The Standard Tank Car Co. has been reorganized and refinanced. J. Bruce Orr of Pittsburgh has been elected president.

Net income of the American Can Co. for the calendar year ended Dec. 31 was $10,983,094. Allowing for dividend on preferred stock, this is equivalent to $19.63 per share earned on the outstanding common stock.

In its report for 1923 the Hercules Powder Co. showed net income of $2,508,669, as compared with $2,264,896 in 1922.

According to its preliminary statement, the New Jersey Zinc Co. realized net income of $6,364,403 in 1923. This is equivalent to earnings of $12.99 per share on the capital stock.

The Union Carbide & Carbon Corporation has declared a quarterly dividend of $1.25, payable April 1, to stock of record March 5. This compares with a previous dividend of $1 quarterly.

Sherwin-Williams Co. has been given permission to list on the New York Stock Exchange $15,000,000 7 per cent cumulative first preferred stock.

Arsenic Production in Belgium

In a report from Antwerp, Vice-Consul Julian F. Harrington states that the Société Générale Métallurgique de Hoboken has an important plant for the manufacture of arsenic at Reppel, in the extreme northeast section of the Province of Limbourg, Belgium. The building itself is old, but in 1919 it was taken over by the present owners and placed in the hands of experts, who completely remodeled it on an up-to-date scientific basis, with modern apparatus. The factory is now considered a striking example of Belgian advancement.

The commodities produced are white arsenic, sulphur arsenic, commonly known as red and yellow arsenic; arsenic acid, and arsenite and arseniate of soda and calcium. These products are extracted principally from the speiss residue of lead and tin mined in the vicinity of Hoboken, natural ores being added to the residues in order to insure a useful metallic character. The mixture of ore is broken, ground and milled very fine before being put into the ovens. For this operation the Société Générale Métallurgique has a very modern electrical system for the crushing, sifting, and necessary transport to the ovens.

During the past 3 years the following amounts of arsenic have been exported from Antwerp to the United States: 1921, 1,069,374 lb., valued at $161,593; 1922, 9,727 lb., worth $2,251; and the first 9 months of 1923, 859,385 lb., worth $88,365.

Stettin Chemical Trade Affected by Ruhr Occupation

In a report from Cornelius Ferris, U. S. Consul at Stettin, he says that one of the leading chemical manufacturing companies of Stettin, as a result of the discontinuance of its connections with the Ruhr district, has discharged 25 per cent of its employees. Before the war this concern employed about 2,000 men, including those at its Danzig and Nienburg branches. Now it has less than 1,200. Of these 750 are in Stettin, compared with 1,000 up to May, 1923.

Sicily Has Largest Citric Acid Plant

A report from Sicily in referring to the citric acid industry says that production in Sicily was unimportant prior to 1913, but a factory at Palermo produced a total of 1,000 tons in the 1913-14 season. This factory is now the largest citric acid producer in the world and turns out about one-fourth of the total production of the world. Two other factories have been built and a third is in course of construction. The three latter factories are at Messina.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	79⅜	77⅜
Allied Chem. & Dye	70¼	68½
Allied Chem. & Dye pfd.	114	113½
Am. Ag. Chem.	13⅝	12⅜
Am. Ag. Chem. pfd.	38½	38
American Cotton Oil c'f's	11⅜	11
Ameican Cyanamid	91	*91
Am. Drug Synd.	5⅝	5⅜
Am. Linseed Co.	20	18⅜
Am. Linseed pfd.	41	40
Am. Smelting & Refining Co.	61	61⅜
Am. Smelting & Refining pfd.	99½	99
Archer-Daniels Mid. Co. w.i.	26	26
Archer-Daniels Mid Co. pfd.	89½	88
Atlas Powder	52⅜	52
Casein Co. of Am.	*66	*65
Certain-Teed Products	31	29½
Commercial Solvents "A"	52	52½
Corn Products	176	177¾
Corn Products pfd.	118	118
Davison Chem.	51	49½
Dow Chem. Co.	*47	*45
Du Pont de Nemours	134	128
Du Pont de Nemours db.	86⅜	86½
Freeport-Texas Sulphur	10⅜	10½
Grasselli Chem.	*125	*125
Grasselli Chem. pfd.	*100	*100
Hercules Powder	*104	*104
Hercules Powder pfd.	*103	*103
Heyden Chem.	2½	2
Int'l Ag. Chem. Co. (new)	5	4⅞
Int'l Ag. Chem. pfd.	6⅜	6½
Int'l Nickel	13⅜	13½
Int'l Nickel pfd.	80½	79
Int'l Salt	89½	89½
Mathieson Alkali	37	33⅜
Merck & Co.	*58	*59
National Lead	144⅜	140
National Lead pfd.	113	114
New Jersey Zinc	*149	*148
Parke, Davis & Co.	80	80
Pennsylvania Salt	*89	86
Procter & Gamble	*130	*130
Sherwin-Williams	30⅜	30½
Sherwin-Williams pfd.	100½	*100½
Tenn. Copper & Chem.	8¼	9
Texas Gulf Sulphur	63⅜	63½
Union Carbide	60	62
United Drug	84	81½
United Dyewood	*40	40
U. S. Industrial Alcohol	78½	75
U. S. Industrial Alcohol pfd.	103½	101
Va.-Car. Chem. Co.	8	7¼
Va.-Car. Chem. pfd.	23½	23

*Nominal. Other quotations based on last sale.

Men You Should Know About

Prof. W. L. BADGER, of the University of Michigan, gave a lecture at the Carnegie Institute of Technology, Pittsburgh, Pa., Feb. 14, on "Evaporation."

ROBERT G. BEAR has been elected secretary and treasurer of the United States Gypsum Co., Chicago, Ill., succeeding E. L. MARSH, resigned. CHARLES F. HENNING has been elected vice-president of the company, in charge of sales.

AXTELL J. BYLES, heretofore vice-president and general counsel of the Tide Water Oil Co., New York, has been elected president, succeeding GEORGE T. SLADE, resigned.

Dr. EMMETT CARVER, who received his graduate and undergraduate training at Harvard, has recently joined the staff of the research laboratory of the Eastman Kodak Co., Rochester, N. Y. During the war he served as Captain in the Intelligence Division. For the 2 years following the war Dr. Carver held a National Research Council fellowship. For the last 3 years he has been on the chemical faculty of the University of Illinois, where he taught physical chemistry.

W. S. FARISH has been re-elected president of the Humble Oil & Refining Co., Houston, Tex.

J. HOWARD FLINT has returned to Athens, N. Y., after completing special experimental chemical engineering work in the nitrate pampa of Chile. He has been at the test plant at Oficina Cecilia for Guggenheim Bros., investigating filtration problems.

C. NELSON GAIN, for the past 8 years general superintendent of the Don Valley Paper Mills, Ltd., Toronto, has been appointed general manager of the Garden City Paper Mills, Ltd., St. Catherines, Ont., and the Canadian Vegetable Parchment Co., Ltd. Mr. Gain is vice-president of the Technical Section of the Canadian Pulp and Paper Association.

ROBERT B. HAND, who is a graduate in chemistry of Wooster College, has accepted a position on the technical staff of the Elyria Enameled Products Co., Elyria, Ohio.

F. R. HARDING, senior industrial fellow of the Mellon Institute, Pittsburgh, Pa., gave an interesting address before the members of the local Chamber of Commerce, Feb. 12, on the subject of "Present-Day Conceptions of Food Values."

W. S. LANDIS, vice-president and chief technologist of the American Cyanamid Co., expects to return from Europe by April 1.

AUSTIN L. LORD is chief chemist for the Nitrate Fertilizer Co., Inc., of Los Angeles. The associated consulting staff comprises S. MAUS PURPLE, in charge of research, Dr. ELLIS GILBERT BAILEY and Dr. R. R. SNOWDON.

C. W. MERRILL, in recognition of his remarkable accomplishment in gold cyaniding, has been awarded the Douglas gold medal.

Dr. M. MUELLER, president of the Rhodia Chemical Co., New York, is absent from the city on a 2 months trip abroad.

G. H. PARSONS, assistant manager of the Master Products Co., miner and grinder of various non-metallic minerals in California, is in New York on business.

Dr. ALVIN C. PURDY has resigned from the staff of instruction of the department of chemistry of Cornell University, to become associated with the Streamline Filter Corporation, New York City, which is now manufacturing under the Hele-Shaw patents. Dr. Purdy will take charge of the chemical division of this work.

T. T. READ, of the Bureau of Mines, has been made acting assistant to the director to perform that portion of the duties formerly done by F. J. BAILEY, resigned, which in the interval between the resignation and now have been performed by the director. Mr. Read will be the administrative and directing official in charge of the Mine Safety Service and D. J. PARKER, chief engineer, will report to Mr. Read. W. D. RYAN and C. L. COLBURN will continue to report to Mr. Parker.

J. S. ROSS, of the Bureau of Mines, Washington, D. C., has been appointed engineer in charge of oil and gas supervisory work at Shreveport, La.

E. P. SHEARWOOD, designing engineer for the Dominion Bridge Co., Ltd., Montreal, has been elected a vice-president of the Engineering Institute of Canada.

C. M. TURNER has resigned as president of the Newport Chemical Works, Passaic, N. J., effective March 1, to become connected with the National Enameling & Stamping Co., New York.

Calendar

AMERICAN CHEMICAL SOCIETY, annual meeting. Washington, April 21 to 25.

AMERICAN ELECTROCHEMICAL SOCIETY, Hotel Bellevue-Stratford, Philadelphia, April 24 to 26.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Denver, Colo., July 15 to 18.

AMERICAN PAPER AND PULP ASSOCIATION, including T.A.P.P.I., Waldorf-Astoria, New York, April 7 to 11.

AMERICAN PAPER AND PULP MILL SUPERINTENDENTS ASSOCIATION, Dayton, May 22 to 24.

AMERICAN PHYSICAL SOCIETY, Washington, April 25 to 26.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, Cleveland, Ohio, May 19 to 22.

AMERICAN SOCIETY FOR TESTING MATERIALS, Atlantic City, June 23 to 28.

CANADIAN INSTITUTE OF MINING AND METALLURGY, King Edward Hotel, Toronto, March 5 to 7.

NATIONAL ASSOCIATION OF PURCHASING AGENTS, Boston, May 19 to 24.

NATIONAL FIRE PROTECTION ASSOCIATION, annual meeting, Atlantic City, N. J., May 13 to 15.

PAPER INDUSTRIES EXPOSITION, New York, April 7 to 12.

CHARLES B. WARREN, president of the Michigan Sugar Co., Detroit, has been elected a member of the board of directors of the Union Trust Co. of that city.

O. F. WEBER, formerly president of the National Aniline & Chemical Co., New York, has left for a trip to Europe.

WALTER L. WEDGER, chief chemist of explosives and inflammables at the Massachusetts Department of Public Safety, has resigned, his resignation to take effect March 1. Mr. Wedger has accepted a position as chief chemist with the Central Railway Signal Co. of the United States and Canada and will have supervision of chemical processes and manufacturing.

Obituary

R. F. FOOTE, late manager of the Maple Leaf Rubber Co., of Port Dalhousie, Ont., and the Independent Rubber Co. of Merriton, Ont., died at Port Dalhousie, Jan. 27.

B. L. KNOWLES, manager of the publicity department of the Worthington Pump Corporation, died Feb. 14, after a short illness. Death was caused by a cerebral hemorrhage. Mr. Knowles was 45 years old and had been in the employ of the Worthington Co. for 28 years.

ROBERT P. NEVILLE, associate chemist of the National Bureau of Standards, died in Washington, Feb. 3, after a protracted illness. Mr. Neville had been active in research on pure platinum and high purity iron-carbon alloys, which work he did as a member of the section of chemical metallurgy of the bureau. His work in this field contributed greatly to the successful studies of the bureau on rare metal thermocouples and the properties of iron-carbon alloys. Mr. Neville was a graduate of Baylor University, Texas. He had been employed in the Bureau of Standards since 1918.

H. P. OLEEN, superintendent of the refining plant of the Galena Signal Oil Co., Galena, on the Houston Ship Channel, Houston, Tex., died in Houston, Feb. 9, at the age of 34.

HUGH A. PLANCK, chief chemist for about 12 years for the National Starch Co. and later assistant superintendent of the Piel Brothers Starch Co., Indianapolis, Ind., died Feb. 7, at the Sunnyside Sanatorium in Indianapolis. During the war he acted as superintendent of acids for the government at Gary, Ind., and while employed in this branch of service, his health broke down. He is survived by a mother and a sister.

Dr. HORACE L. WHITE died suddenly at Alhambra, Calif., on Jan. 28. A graduate of the University of Maine, Dr. White served in the Spanish-American War, afterward becoming instructor of chemistry in the University of Vermont and later at the Agricultural College at Fargo, N. D. Subsequently he became professor of chemistry in the University of South California, medical department. At the time of his death he was connected with the Los Angeles Laboratory.

Market Conditions

Irregularity in Consuming Industries Prevents Active Call for Chemicals

Most Important Materials Are on Steady Basis, but Weighted Index Is Lowered by Weakness in Allied Products

REPORTS from various consuming industries reveal that activity in one branch is offset by slowness in others and this irregularity in the manufacturing end is reflected in the movement of chemicals and raw materials. This may be illustrated in the textile industry where reports from different sections of the country show widely differing conditions. The fact that buyers of chemicals are well covered ahead on contracts also is a factor in checked buying operations in the spot market. The movement of chemicals from works against old orders is fairly large although suffering in most cases in comparison with the corresponding period of last year.

Distribution of finished products also is backward and this has a bearing on the market for chemicals. There is every indication that consumption of fertilizers will far surpass that of last season but loadings to date have not come up to expectations and the American Railway Association issued warning last week to the effect that deferred shipments may bring out a car shortage. Calcium arsenate is another material which has failed to find the outlet expected and this lends uncertainty to production and values for arsenic.

The weighted index number for the week was 162.19 as compared with 163.62 for the preceding week. A large part of the decline is attributed to variations in kindred products rather than to changes in the strictly chemical list. At this time last year trading was active and values were on an upward trend.

Acids

The position of mineral acids has not changed much in recent weeks. It is difficult to give a fixed quotation for sulphuric acid on contract. Prices vary according to quantity and seller. Sales of 60 deg. acid were made last week at $9 per ton, tanks, prompt from works and 66 deg. acid, same basis, sold at $14 per ton. Quotations of $16 per ton are heard for 20 deg. fuming. Citric and tartaric acids continue to hold a firm position with trading in the past few weeks along broader lines. Oxalic acid is irregular in price and just at present domestic is underselling the foreign product. Cables quote foreign oxalic for shipment as high as 11½c. per lb., as compared with quotations of 10½c. per lb., at works, for domestic acid. Formic acid is moving in a satisfactory manner and according to some reports is cutting into fields where preference formerly was given to other acids.

Potashes

Bichromate of Potash—Offerings are in firm hands and improved demand has reduced stocks. In some quarters only limited amounts are available and 9⅜c. per lb. is asked. It is still possible to do 9⅛c. per lb., but on moderate sized lots the quotation ranges from 9⅜c. to 10c. per lb. In addition to buying by domestic consumers, export interests have been in the market.

Arsenic Lower on Spot and for Shipment — Tin Oxide Advanced 2c. Per lb. — Yellow Prussiate of Potash Lower—Fusel Oil in Larger Supply—Imported Oxalic Acid Firmer —Bleaching Powder Steady at Recent Advance.

Caustic Potash—The most important development in this market is found in a higher market for shipments from abroad. Cables received during the week worked out at 6½c. per lb., which places the shipment price on a parity with the spot market. Holders of domestic caustic have quoted 7½c. per lb., at works, but the differential is still too favorable to the imported for any large business in the domestic.

Chlorate of Potash—Large consumers are reported to be covered ahead and the greater part of foreign arrivals do not enter the market. Current trading is quiet and prices are holding at 7@7½c. per lb. for imported, according to grade and seller. Domestic chlorate is still on the market despite the fact that production has ceased and is held at 8½@9c. per lb.

Permanganate of Potash—There has been no trading of importance and quotations for imported permanganate are largely nominal at 14@14½c. per lb. Shipment prices have held a premium over spot goods and this is still the case. Hence there is no interest in forward positions as far as foreign-made goods are concerned. Domestic makers still offer at 14@15c. per lb., but in some quarters it is stated that prices are due to advance.

Prussiate of Potash—The quiet call for stocks has weakened the spot market and offerings of yellow prussiate were available during the week at 19½c. per lb. Quotations from abroad, however, were unchanged and 18c. per lb. was the lowest price heard on shipments. Red prussiate is dull and nominal at 45@48c. per lb., according to seller.

Sodas

Acetate of Soda—Different prices are heard for this material and the range according to seller is the main feature of the market. Asking prices range from 5c. to 5½c. per lb. but the inside figure is not firm and some reports credit sales as low as 4½c. per lb.

Bichromate of Soda — Consumers have shown more interest in this chemical and sales to the tanning trade are reported to have expanded. The undertone to values in recent weeks has been strong and this is further borne out by reports that some first hands are quoting contracts on the same basis as the spot market. Spot material is offered at 7½@8c. per lb. depending on seller and quantity.

Caustic Soda—Call for new supplies so far this month has not been heavy. Jobbing trade is rather quiet and even the amounts ordered out against old orders has shown a falling off. There still continues, however, a good movement against contract and stocks are said to be well controlled. Prices show no variations from previous schedules and the contract quotation remains at $3.10 per 100 lb. for carlots at works. Export inquiry does not run to large volumes but $3 per 100 lb. f.a.s. New York is the lowest price heard for export business.

Fluoride of Soda—Supplies of imported fluoride have been reduced in the spot market and holders are inclined to be firmer in their views. There is no pressure on the part of foreign markets and this also acts as a steadying factor on spot prices. Quotations are on a basis of 9@9½c. per lb. Domestic grades are quiet at 10@10½c. per lb.

Nitrate of Soda—The local market has been stronger and with offerings light, holders have maintained prices at $2.50 per 100 lb. In southern markets low priced lots have been absorbed and values reacted with $2.45 per 100 lb. now established as the market price. Sales at primary points are reported to have increased in volume but stocks are increasing. Refined nitrate is quoted at 4¼@4½c. per lb. for granulated, 5@5½c. per lb. for powdered.

Prussiate of Soda—There was some talk in the trade to the effect that the strike of dock workers in England would have a strengthening effect on prussiate but this was discounted by

the belief that the strike would be of short duration. Offerings of spot prussiate were free at 11⅜@11½c. per lb. and shipments were quoted at 11@11¼c. per lb. Demand was quiet.

Miscellaneous Chemicals

Arsenic—There has been no opening up in the calcium arsenate demand and manufacturers of the poison are slow to take on stocks of arsenic. Some foreign markets have weakened under the quiet buying movement and Japanese exporters were offering last week at 11¼c. per lb. for nearby positions and it was stated that later deliveries could be bought under that figure. The spot market whether influenced by lower shipment prices or lack of buying orders was weak and open quotations of 12c. per lb. were heard. Relative to shipment prices it was said that European markets were reserved and the lower prices heard were restricted to offerings from Japan.

Barium Carbonate—There were scattered offerings of imported grades on the market at $63 per ton in carlots. The lower prices quoted for imported offerings had no effect on domestic material and immediate shipment from works is held at $70 per ton with later deliveries at $68 per ton. Barium sulphide is in limited supply but producers will quote on specific quantities for nearby delivery with values around $45 per ton.

Bleaching Powder—The advance in price as announced in the preceding week has been fully maintained. The keen competition among sellers which featured trading in the latter part of last year has disappeared and values are being based more on producing costs. A large part of the trade, however, placed contracts when prices were lower and current prices can do little else but bring up the average price of sellers to a slight degree. Producers now ask $1.75 per 100 lb. for standard drums, carlots at works.

Fusel Oil—Importations of fusel oil have increased in the past month and quite a few offerings have come on the market at lower prices. Not so long ago crude material sold at $4 per gal. and upward, but within the past week consumers were in a position to take on supplies at prices ranging from $2.50@$3.00 per gal., the price depending upon the quantity and delivery. Refined fusel oil was nominal around $3.50 per gal.

Sal Ammoniac — If anything this material was easier during the week as white granular afloat was offered at 6¾c. per lb. Spot holdings were maintained at 6¼c. per lb., but shipment from abroad was offered at 6¼c. per lb. Buyers were not showing interest in large lots. Domestic grades were offered at 7⅛@7⅜c. per lb., at works, for white granular and at 8@8¼c. per lb. for gray.

Tin Oxide—An active market for tin has continued and high prices for the metal have brought about a further revision in the sales price for the oxide. Prominent producers now ask 55c. per lb. for oxide. There are some sellers who have offered oxide below the prices generally quoted and this condition still exists.

Zinc Dust—All the zinc products are in a firm position in sympathy with the strength in metal. Domestic producers offer zinc dust in carlots at 8½c. per lb. While this is a works price it is a delivered price also within certain sectional limits.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	162.19
Last week	163.62
Feb., 1923	178.00
Feb., 1922	148.00
Feb., 1921	166.00
Feb., 1920	252.00
Feb., 1919	250.00
Feb., 1918	285.00

The reduction in the weighted index number, amounting to 143 points, was brought about by the decline in allied chemical products, chief of which was the drop in crude cottonseed oil.

Alcohol

Reports from nearly all quarters state that business in denatured alcohol has been holding up well and the market continues in a rather firm position. No price changes took place, leading factors offering the No. 5 completely denatured on the carload basis of 44½c. per gal., drums extra. Demand for methanol was inactive, yet prices closed quotably unchanged, the pure settling at 90c. per gal., tank car basis. With production of methanol curtailed stocks are not pressing on the market.

Coal-Tar Products

Crudes Generally Firm—Demand Moderate—Cresylic Acid Steadies on British Dock Strike News—Pyridine Easy

TRADING in coal-tar products was less active, but this failed to check the confidence of holders of crudes. In fact, the undertone on benzene was just as firm as a week ago, production in most directions being sold up as a result of the recent activity in the motor fuel grade. Stocks of toluene are limited, reflecting close control at producing centers. Developments in the cresylic acid situation attracted more attention. The strike of dock workers in the United Kingdom may retard the movement of material to this country, and importers were inclined to hold out for better prices on goods on hand and to arrive. Consumers, on the other hand, showed only fair buying interest, believing that enough cresylic will be available regardless of the situation abroad. Phenol on spot continues in scanty supply and on outside lots the market was firm, with prices wholly nominal. There was no change in contract prices for phenol. Refined naphthalene was firmer, but this did not bring out a general change in quotations. Most of the intermediates were in a more or less nominal position as regards prices, as competition for business is keen.

Aniline Oil and Salt—First hands reported a firm market for aniline oil, sales passing on the basis of 16c. per lb., drums extra, carload basis, nearby delivery. Aniline salt was offered at 23c. per lb. in most quarters, but it was said that this figure could have been shaded.

Alpha-Naphthylamine—Demand was quiet and prices of 35@35¼c. per lb. were barely steady.

Benzene—Leading producers regarded the market as firm. Prices, however, underwent no further changes. Most of the business passing was in the motor fuel grades. The generally firmer position of petroleum products was accepted by traders as sufficient cause for a continuation of rather firm prices for the coal-tar product. Export inquiry was around in the past week, but so far as could be learned no large quantities sold for shipment abroad. The 90 per cent grade held at 23c. per gal., and the pure at 25c. per gal., tank cars, works.

Cresylic Acid—Shipments of crude material have been coming to this country from the United Kingdom with regularity, but the strike of the British dock workers, announced last week, created a feeling of distrust as regards future deliveries and importers were disposed to take a firmer view of the situation. Prices, however, closed practically unchanged.

Diethylaniline—Closing prices ranged from 53@55c. per lb., depending upon the seller and quantity. One of the leading producers held out for the top figure.

Naphthalene—Business in refined has not yet assumed large proportions, and while the market is steady, prices on flake held at 6@6¼c. per lb., the inside figure obtaining on carload lots for shipment. Chips held at 5¼@5⅜c. per lb. Crude naphthalene was available for shipment from the Continent at practically unchanged prices.

Paranitraniline—Offerings were large enough to unsettle the market and scattered business went through at 68@69c. per lb., immediate delivery.

Phenol—Offerings by first hands continue light and this tends to support prices for material held in second hands. On odd lots asking prices named by "outside" traders ranged from 35@36¼c. per lb., in drums. Nominal quotations named by producers, covering forward material, held at 28@29c. per lb., drums extra.

Pyridine—Not much buying interest was apparent in pyridine, and prices were under pressure, ranging from $3@$3.50 per gal., according to quantity and position.

Solvent Naphtha—Producers offered water-white naphtha at 25c. per gal., tank cars, works, with the market firm on moderate stocks.

Vegetable Oils and Fats

Cottonseed Lower on Liquidation—January Distribution Smaller Than Year Ago—Linseed Oil Advances—Tallow Firm

THE feature in the way of price changes was the decline in both crude and refined cottonseed oil. The monthly statistics indicated that consumption of cottonseed oil in January ran 39,000 bbl. behind the January total of a year ago. Linseed oil was inactive, but with stocks rather tight and seed higher crushers took advantage of the situation and marked up prices to the extent of 1c. per gal. China wood oil was under pressure. Coconut oil was barely steady. Resale parcels of palm oil sold at concessions. Tallow was raised on the sale of 50 drums to a local soap maker. There was a good demand for greases.

Cottonseed Oil—Crude cottonseed oil sold down to 8¼c., tank cars, Texas, and at 8⅝c., tank cars, Southeast. A week ago sales in the Southeast went through at 8¾c., f.o.b. mills. The decline in price was brought about by the pressure in refined oil, Southern interests liquidating March oil in the New York option market. The bearish January report on cottonseed products was a factor. According to an analysis of the report the consumption of refined oil in January amounted to 203,000 bbl., against 242,000 bbl. in January a year ago. Consumption for the 6 months ended Jan. 31 amounted to 1,171,000 bbl., comparing with 1,408,000 bbl. for the corresponding period a year ago. The visible supply of oil, converting seed holdings into oil, stood at 1,144,000 bbl. on the last day of January, against 1,078,000 bbl. a year ago. February business to date has not come up to expectations. Lard compound was offered at 12c. per lb., carload basis, although most producers held out for 12¼@12½c. per lb. The options on the Produce Exchange sold down to new lows, during the past week, March selling below 10c. per lb. Switching operations again took place on a large scale and professional traders believe that the May option now is in a top heavy position.

Linseed Oil—No important buying took place in the past week. The undertone, however, remained firm and crushers marked up prices on the strength in nearby seed. There has been some good buying of Argentine seed of late, but crushers find it difficult to locate freight room and there is a possibility that the shortage in oil supplies may continue over the next 2 months. The fact that crushers are asking 93@94c. per gal., cooperage basis, for raw oil for delivery over the next 3 months would indicate that they regard the nearby positions as firm. The weakness in cake has added to the strength in oil. Consumers refused to depart from their policy of buying in a hand-to-mouth way. The flaxseed crop developments in this country will play an important part in the near future, and, according to advices from the Northwest, indications point to a liberal gain in the acreage. There appears to be little doubt regarding the course of the seed markets for the next month or so, but traders believe that prices will go lower early in May. In the meantime the professional traders in the Argentine are operating on the long side of the market. The Indian crop is getting along nicely, the outturn being estimated as slightly in excess of last season's production.

China Wood Oil—It was reported that China wood oil sold at 17⅞c. per lb., tank cars, f.o.b. Pacific coast ports, with the market unsettled at the close.

Gain in Cottonseed Receipts

Receipts of cottonseed at the mills in January amounted to 252,058 tons, against 202,808 tons in January a year ago. This development was one of the features of the report on cottonseed and cottonseed products issued in the past week by the Bureau of the Census. The report, which covers the 6 months ended Jan. 31, with a comparison, follows:

	1923-24	1922-23
Seed received, ton..	2,975,144	3,020,934
Seed crushed, ton...	2,403,566	2,501,720
Crude oil mfd., lb..	707,519,366	759,779,684
Refd. oil mfd., lb...	506,430,300	596,272,680
Cake and meal, ton	1,100,082	1,137,076
Stocks, Jan. 31:		
Seed, ton.....	577,693	527,777
Crude oil, lb.....	136,347,611	95,787,416
Refined oil, lb....	175,929,732	197,528,227
Exports, 6 months:		
Crude oil, lb.....	15,730,246	15,908,150
Refined oil, lb. ..	7,898,879	26,924,603
Cake, ton.....	35,675	17,016

In New York 19c. was asked for spot oil, in cooperage.

Coconut Oil—Resale Ceylon type oil sold at 8¼c. per lb., San Francisco, 10 cars changing hands about a week ago. Later bids at 8¼c. were turned down. Towards the close, however, the bids were withdrawn and the market was regarded as little more than nominal at 8¼c. per lb., coast, all positions. Ceylon type oil was offered at 8⅜c. per lb., tank cars, f.o.b. New York.

Olive Oil Foots—The spot market was firm at 10½c. per lb. On futures there were offerings at 9⅜c. per lb., c.i.f. N. Y., but demand was inactive.

Palm Oils—Niger oil sold on spot at 6⅝c. and later at 6⅜c. per lb. Niger for shipment held at 7c. asked. Lagos for shipment was firm at 7.85c. per lb., c.i.f. New York. Soap makers held off.

Soya Bean Oil—Paint manufacturers showed a little interest in the market, but offerings were scanty and prices wholly nominal. Crude oil on the coast closed around 10c. per lb., tank cars, duty paid, while in the local market 10⅝c. per lb. represented sellers' views.

Tallow, Etc.—There was some doubt as to the real position of the market. One lot of 50 drums of extra sold at 8¼c. per lb., an advance of ¼c., but larger buyers did not care to recognize this as the trading basis for round lots. There was a bid in the market for a large quantity of extra tallow at 8c. per lb., ex plant. Yellow grease was in demand and firm at 6⅞@7c. per lb., according to acidity. Red oil on resale was available at 7½c. per lb., carload basis. Oleo stearine sold at 9⅛c. per lb., a decline of ⅛c. German degras sold at 3⅜c. per lb., while pale English was offered at 5½c. per lb.

Miscellaneous Materials

Antimony—Demand was good and prices again moved higher, Chinese brands closing at 11@11½c. per lb., a net gain of ½c. for the week. Importations have increased of late, but this failed to check the upturn. Cookson's "C" grade was raised to 14@14½c. per lb. While oxide, 99 per cent, held at 9@9½c. per lb.

Blanc Fixe—There were offerings of blanc fixe for immediate shipment at 3⅜c. per lb., in bbl., carload basis. On less than carload lots asking prices on the dry ranged from 4@4½c. per lb.

Casein—Competition for business was keen enough to unsettle prices. It was reported that domestic producers were offering supplies on a parity with the imported product. The market for ordinary material settled at 12@13c. per lb., as to quantity and seller. A fairly large shipment arrived last week from the Argentine.

Glycerine—The nominal quotation for chemically pure glycerine held at 16½c. per lb., New York, but the undertone was barely steady, reflecting moderate activity and keen competition. Dynamite glycerine settled at 15c. per lb., carload basis, f.o.b. point of production. Soap lye crude, 80 per cent, loose, was unchanged at 10½@10½c. per lb.

Naval Stores—There was a better call for spirits of turpentine and prices advanced to $1.03@$1.04 per gal., a gain of 3c. for the week. Rosins also were firmer, the lower grades closing at $5.75@$5.85 per bbl.

Lithopone—Business has been good and leading producers regard the market as firm at 6⅜c. per lb., in bags, and 6⅝c. per lb., in bbl., carload basis, prompt and nearby delivery.

White Lead, etc.—Trading in lead pigments has been up to normal for this season of the year and with a strong situation in the metal the undertone in all directions remains strong. But no open change in the selling schedule took place in the past week, corroders offering standard dry white lead, basic carbonate, at 9⅜c. per lb., in casks, carload lots or more. The market for pig lead has been raised to 8½c. per lb., by the leading interest, with little available at less than 9½c. in the open market. It was reported that considerable tonnages changed hands at 9½c. for February and early March shipment.

Zinc Oxide—The recent improvement in the price of the metal has steadied the market for oxide. Competition for business has been keen. Business, from the standpoint of volume, compares favorably with a year ago. American process, commercially lead free, in bags, held at 7⅞c. per lb. On the leaded grades producers quote 7@7½c. per lb. French process red seal was offered at 9⅜c., with the green seal at 10⅜c. and the white seal at 12c. per lb., carload basis.

Imports at the Port of New York

February 15 to February 20

ACIDS—Cresylic—1 pkg., Manchester, De Mattia Chemical Co. **Formic**—98 carboys, Hamburg, International Acceptance Bank; 321 carboys, Hamburg, Order. **Oxalic**—27 bbl. Hamburg, Brown Bros. & Co.; 80 bbl. and 61 csk., Hamburg, Order; 66 csk., Christiania, Roessler & Hasslacher Chemical Co. **Tartaric**—485 keg, Rotterdam, W. Benkert & Co.; 190 keg and 60 bbl., Rotterdam, W. Benkert & Co.; 100 csk., Rotterdam, Order.

ALBUMEN—32 cs., Shanghai, Order.

ALCOHOL—125 bbl., Arecibo, C. Esteva.

AMMONIUM CARBONATE—10 bbl. and 10 csk., Liverpool, Brown Bros. & Co.

AMMONIUM CITRATE—21 cs., London. Irving Bank-Col. Trust Co.

AMMONIUM NITRATE—414 csk., Hamburg, Order.

ANTIMONY—68 csk., Newcastle-on-Tyne, E. Hill's Son & Co.; 250 cs., crude, Hamburg, Order; 150 cs., Rotterdam, Wah Chang Trading Corp.

ANTIMONY OXIDE—250 bg., Hankow, C. Hardy & Ruperti, 75 csk., Newcastle-on-Tyne, E. Hill's Son & Co.

ANTIMONY REGULUS—200 cs., Changshea, Irving Bank-Col. Trust Co.; 400 cs. Hankow, Asia Bank Corp.; 1,750 cs, Shanghai, Wah Chang Trading Corp.; 149 cs, Shanghai, Bank of America; 500 cs, Shanghai, Irving Bank-Col. Trust Co.; 500 cs, Shanghai, Union Trust Co.; 160 pkg, Hankow, C. Hardy & Ruperti; 500 cs, Shaghai, International Banking Corp.; 500 cs, Shangsha, C. Gitlan; 200 cs, Hankow, Asia Banking Corp.; 250 cs, Hankow, National Bank of Commerce.

ARSENIC—47 csk., Brisbane, Order; 67 bbl., Melbourne, Order; 250 dr., Bristol, C. Tennant Sons & Co.; 150 cs. Hamburg, A. Klipstein & Co.

BARIUM CHLORIDE—150 bbl., Bremen, Order.

BARIUM CARBONATE—400 bg., Newcastle-on-Tyne, R. W. Greeff & Co.

BARIUM HYDRATE—31 bbl., Hamburg, Brown Bros. & Co.

BARYTES—50 tons lump, Newcastle-on-Tyne, W. Schall & Co.; 250 bg., Rotterdam, H. Kastor.

BAUXITE—176 tons, Paramaribo, A. M. Kohler.

BRONZE POWDER—9 cs., Bremen, Bank of the Manhattan Co.

CALCIUM ARSENATE—2 dr., Hamburg, Philipp Bauer Co.

CALCIUM CHLORIDE—158 dr., Hamburg, E. Suter & Co.

CAMPHOR—100 cs., Vancouver (transshipment goods), C. Pfizer & Co.

CASEIN—3335 bg., Buenos Aires, Kalbfleisch Corp.

CHALK—150 bg., Bristol, H. J. Baker & Bro.; 200 bbl., Antwerp, Bankers Trust Co.; 500 bg., Antwerp, L. A. Salomon & Bros.; 300 bg., Antwerp, Brown Bros. & Co.; 550 bg., Antwerp, Order.

CHEMICALS—560 bg., Glasgow, Brown Bros. & Co.; 55 csk., Glasgow, Order; 30 bbl., Bremen, Stanley Daggett Co.; 114 csk., Rotterdam, Chemical National Bank; 49 csk., Hamburg, Pfaltz & Bauer; 10 cs., Manchester, E. Fougera & Co.; 13 cs., Rotterdam, Kuttroff, Pickhardt & Co.; 308 csk., Rotterdam, Hummel & Robinson; 45 pkg., Rotterdam, Order.

CHROME ORE — 2,500 tons, Sydney, Order.

CHINA CLAY—417 bg., Bristol, J. W. Hampton & Co.; 30 csk., Bristol, C. C. English Co.

COAL-TAR DISTILLATE—60 dr. Glasgow, Order.

COLORS—50 csk. earth, Bremen, Heller & Merz Co.; 10 cs. aniline, Genoa, American Exchange National Bank; 6 cs. do., Genoa, L. & R. Organic Products Co.; 25 cs., Genoa, Order; 25 csk. earth, Hamburg, J. C. Furman; 46 csk. earth, Hamburg, Reichard-Coulston, Inc.; 13 csk. aniline, Rotterdam, Garfield Aniline Works, Inc.; 20 csk. do., Rotterdam, Bank of the Manhattan Co.; 27 pkg. do., Rotterdam, Kuttroff, Pickhardt & Co.; 3 cs. aniline, Rotterdam, Colour Service Co.; 42 pkg., Rotterdam, H. A. Metz & Co.

COPPER SULPHATE—200 bbl., Hamburg, C. Hardy, Inc.

DIVI-DIVI—3,376 bg., Curacao, Selma Mercantile Corp.; 620 bg., Pampatar, Eggers & Heinlein; 290 bg., Cumana, Schaltz & Co.

EPSOM SALT — 500 bg., Bremen, E. Suter & Co.

FERRIC CHLORIDE—24 csk., Bremen, Mallinckrodt Chemical Works.

FERTILIZER—800 bg. fish, Aberdeen, Hollingshurst & Co.

FUSEL OIL—24 dr. Rotterdam, Order; 18 csk., Rotterdam, W. Van Doorn; 7 csk., Rotterdam, Order; 4 csk., Hamburg, A. Klipstein & Co.; 17 csk., Hamburg, Order.

GAMBIER—149 bg., Singapore, Order.

GLAUBER SALT—125 bbl., Hamburg, E. M. Sergeant & Co.; 114 bbl., Hamburg, Roessler & Hasslacher Chemical Co.; 758 csk., Hamburg, E. Suter & Co.

GUMS—100 cs. damar, Singapore, L. C. Gillespie & Son; 100 cs. do., Singapore, Order; 1,144 bg. arabic, Bombay, Guaranty Trust Co.; 120 bg., Bombay, Order; 134 bg. karaya, Bombay, British Bank of South America; 722 bg., karaya, Bombay, Order; 467 bg. karaya, Bombay, Guaranty Trust Co.; 315 bg. tragacanth, Bombay, Order; 26 cs. tragacanth, London, Orbis Trading Co.; 5 cs. kauri, London, Davies, Turner & Co.; 689 bg. yacca, Adelaide, Order; 64 bg. copal, Singapore, Order; 306 bg. copal, Antwerp, Chemical National Bank; 812 bg. copal, Antwerp, Order.

IRON OXIDE—320 bg., Bristol, G. Z. Collins, & Co.; 74 csk., Bristol, Order.

IRON SULPHATE—32 bbl., Hamburg, Farmers Loan & Trust Co.

LOGWOOD EXTRACT—20 csk., Jamaica, J. Campbell & Co.; 110 bbl., Cape Haitian, Logwood Mfg. Corp.; 5 dr., Liverpool, Order.

LITHOPONE— 200 csk., Antwerp, A. Klipstein & Co.

MAGNESITE — 313 bg., Rotterdam, Speiden. Whitfield Co.; 188 bg. and 66 bbl., Rotterdam, A. Kramer & Co.

MAGNESIUM CALCINED—47 cs., Newcastle-on-Tyne, Order.

MAGNESIUM CARBONATE — 37 csk. and 112 bg., Newcastle-on-Tyne, Order; 35 cs., Newcastle-on-Tyne, Order.

MYROBALANS—3,139 bg., Bombay, National City Bank; 2,980 bg., Bombay, Order; 1,000 pkt., Calcutta, Order.

NICKEL ORE—A quantity in bulk, Sydney, United States Nickel Co.

NAPHTHALENE — 439 bg., Bristol, Order; 473 bg. and 48 csk., Hamburg, Order.

OILS—Coconut—700 tons (bulk), Manila, Order; 700 tons (bulk), Manila, Order; 680 tons (bulk), Manila, Philippine Refining Co. **China Wood** — 1,000 bbl., Hankow, Spencer Kellogg & Sons; 291 bbl., Hankow, Jardine, Matheson & Co.; 184 bbl., Hankow, Order; 570 csk., Hankow, Sino Java H'v'g.; 448 csk., Hankow, Balfour, Williamson & Co.; 1,227 csk., Hankow, Bingham & Co.; 100 dr., Hong Kong, I. R. Boody & Co.; 250 dr., Hong Kong, National City Bank; 156 bbl., Tientsin, Order; 297 csk., Hankow, Irving Bank-Col. Trust Co.; 734 csk., Hankow, Order. **Cod**—200 bbl., Aberdeen, J. D. Irwin; 200 bbl., Aberdeen, W. Schall & Co.; 100 bbl., Aberdeen, Order; 25 csk., St. Johns, Order. **Olive foots** (Sulphur oil)—200 bbl., Naples, Banca Comm. Italo. **Palm**—191 csk., Hamburg, African & Eastern Trading Co.; 5 dr., Liverpool, North American Grain Corp. **Rapeseed**—100 bbl., Hull, Balfour, Williamson & Co.; 200 bbl., Hull, J. C. Francesconi & Co.; 570 bbl., Hull, Order; 64 bbl., Liverpool, Order. **Sesame**—200 bbl., Bristol, Order. **Sperm**—50 bbl., Glasgow, Order. **Seal**—6 bbl., Copenhagen, Order.

OIL SEEDS—Castor—20,541 bg., Bombay, Order; 4,000 bg., Santos, F. Matarazzo & Co. **Linseed**—12,493 bg., Buenos Aires, L. Dreyfus & Co.

PITCH—50 bbl. oil, Glasgow, Order; 78 bbl., Hull, Order; 270 bbl., Rotterdam, Order; 52 bbl. stearine, Rotterdam, Order.

POTASSIUM SALTS—25 csk. carbonate, Bremen, P. H. Petry & Co.; 535 dr., caustic, Rotterdam, Order; 102 csk. caustic, Hamburg, T. Goldschmidt Corp.; 67 dr. caustic, Hamburg, Superfos Co; 250 bg. alum, Hamburg, Order; 250 bbl. alum, Hamburg, Order; 14 csk. prussiate, Rotterdam, C. F. Smillie & Co.

PLUMBAGO—327 bbl., Colombo, Order.

PYRIDINE—1 dr., Hamburg, C. Page & Co.; 2 dr., Hamburg, North Am. Service Co.

QUEBRACHO—9,442 bg., Buenos Aires, Tannin Corp.; 7,684 bg., Buenos Aires, International Products Corp.; 3,064 bg., Buenos Aires, National Bank of Commerce; 2,030 bg., Buenos Aires, Order; 7,335 bg., Buenos Aires, Int'l. Products Co.

ROSIN—991 bg. accaroid, Adelaide, Order.

SAL AMMONIAC—250 csk., Rotterdam. Kuttroff, Pickhardt Co.; 38 csk., Hamburg, Order.

SHELLAC — 100 bg., Southhampton, Order; 165 bg. refuse, Calcutta, Bank of the Manhattan Co.; 200 bg., Calcutta, Standard Bank of South Africa; 300 bg., Calcutta, National City Bank; 100 bg., Calcutta, Mechanics & Metals National Bank; 900 bg., Calcutta, Order.

SODIUM SALTS—100 dr. sulphite, Bristol, R. F. Downing & Co.; 20 dr. do., Bristol, J. W. Hampton & Co.; 160 dr., Hamburg, A. Klipstein & Co.; 312 dr. sulphite, Hamburg, C. S. Grant & Co.; 11 bbl. bifluoride, Hamburg, Brown Bros. & Co.; 74 csk. nitrite, Hamburg, Order; 34 csk. prussiate, Hamburg, Order; 40 cs. cyanide, Liverpool, American British Supplies Co.; 40 cs. cyanide, Liverpool, Order; 99 csk. prussiate, Liverpool, Order; 25 csk. hydrosulphite, Rotterdam, H. A. Metz & Co.

STARCH—250 bg., Rotterdam, A. Hoffman & Co.

TUNGSTEN—100 cs., Hamburg, Order.

WAXES—190 cs. beeswax, Lisbon, Order; 59 bg. beeswax, Alexandria, Bank of America; 302 pkg. beeswax, Liverpool, Order; 12 cs. beeswax, Santos, T. Norton & Co.; 21 bbl. do., Rio de Janeiro, D. Steengrafe.

WOOL GREASE — 200 bbl., Bremen, Hummel & Robinson; 200 bbl., Bremen, American Exchange National Bank; 34 bbl., Bremen, Schneider Bros.; 100 bbl., Bremen, Order; 300 csk., Hamburg, Kidder, Peabody & Co.; 100 bbl., Manchester, Am. Trust Co. of Boston.

ZINC OXIDE—125 bbl., Antwerp, Brown Bros & Co.

Industrial Notes

THE SULLIVAN MACHINERY CO., Chicago, Ill., has moved its Birmingham, Ala., office to 2108 5th Ave., North. G. P. Small is local manager.

THE LINK-BELT CO., Chicago, Ill., announces the appointment of C. S. Huntington, sales engineer in charge of the sand and gravel washing division of the company in Chicago, to look after the interests of the Link-Belt Co. in the cement industry, in addition to his regular duties. It is also announced that Howard MacNeal, formerly of the Philadelphia plant has been transferred to the Chicago works, where he will attend to the promotion of portable loaders, portable belt conveyors and electric hoists.

F. J. WALKER, formerly with the Cutler-Hammer Co. and more recently with the Economy Fuse & Mfg. Co., Chicago, Ill., is now with the Connecticut Telephone & Electric Co. of Meriden, Conn., promoting the sales of cold molded or formed insulation.

THE RUBBER SERVICE LABORATORIES CO., Akron, O., announces that Winfield Scott has become associated with it. His work will be along the line of research on organic accelerators. Mr. Scott is the author of several papers on accelerators and is a man with many years experience, having formerly been connected with the Goodyear and the Quaker City rubber companies and later with E. I. du Pont de Nemours & Co.

F. G. ANDERSON, formerly New York sales manager of the Morse Chain Co., is now associated with the Ramsey Chain Co., Inc., as New York sales manager, Liggett Bldg., New York City. The main office and works of the Ramsey Chain Co. are located in Albany, N. Y.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums, wks.	lb.	$0.19 –	$0.19½
Acetic anhydride, 85%, dr.	lb.	.38 –	....
Acid, acetic, 28%, bbl.	100 lb.	3.38 –	3.63
Acetic, 56%, bbl.	100 lb.	6.75 –	7.00
Acetic, 80%, bbl.	100 lb.	9.58 –	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 –	12.78
Boric, bbl.	lb.	.10 –	....
Citric, kegs	lb.	.46½ –	.48
Formic, 85%	lb.	.13½ –	.13¾
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½ –	.12
22% tech., light, bbl.	lb.	.05½ –	.06
Muriatic, 18° tanks	100 lb.	.90 –	1.00
Muriatic, 20°, tanks	100 lb.	1.00 –	1.10
Nitric, 36°, carboys	lb.	.04½ –	.05
Nitric, 42°, carboys	lb.	.05¼ –	.05½
Oleum, 20%, tanks	ton	16.00 –	17.00
Oxalic, crystals, bbl.	lb.	.10½ –	.11
Phosphoric, 50% carboys	lb.	.07½ –	.08½
Pyrogallic, resublimed	lb.	1.55 –	1.60
Sulphuric, 60°, tanks	ton	9.00 –	10.00
Sulphuric, 60°, drums	ton	13.00 –	14.00
Sulphuric, 66°, tanks	ton	14.00 –	15.00
Sulphuric, 66° drums	ton	19.00 –	20.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.27 –	.27½
Tartaric, domestic, bbl.	lb.	.30 –	....
Tungstic, per lb.	lb.	1.20 –	1.25
Alcohol, butyl, drums, f.o.b. works	lb.	.45 –	.50
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.85 –	....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.81 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.51½ –	....
No. 1, 190 proof, special, dr.	gal.	.45½ –	....
No. 1, 188 proof, bbl.	gal.	.52½ –	....
No. 1, 188 proof, dr.	gal.	.48½ –	....
No. 5, 188 proof, bbl.	gal.	.50½ –	....
No. 5, 188 proof, dr.	gal.	.44½ –	....
Alum, ammonia, lump, bbl.	lb.	.03¼ –	.04
Potash, lump, bbl.	lb.	.02¾ –	.03½
Chrome, lump, potash, bbl.	lb.	.05½ –	.06
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.50
Iron free bags	lb.	2.40 –	2.50
Aqua ammonia, 26°, drums	lb.	.06½ –	.06¾
Ammonia, anhydrous, cyl.	lb.	.28 –	.30
Ammonium carbonate, powd. tech., casks	lb.	.10 –	.10½
Ammonium nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	4.50 –	4.75
Antimony oxide, white, bbl.	lb.	.09 –	....
Arsenic, white, powd., bbl.	lb.	.12 –	.12½
Arsenic, red, powd., kegs	lb.	.15 –	.15½
Barium carbonate, bbl.	ton	63.00 –	68.00
Barium chloride, bbl.	ton	82.00 –	88.00
Barium dioxide, 88%, drums	lb.	.17½ –	.18
Barium nitrate, casks	lb.	.08 –	.08¼
Blanc fixe, dry, bbl.	lb.	.03½ –	.04
Bleaching powder, f.o.b. wks., drums	100 lb.	1.75 –	....
Spot N. Y. drums	100 lb.	2.10 –	....
Borax, bbl.	lb.	.05½ –	.05½
Bromine, cases	lb.	.28 –	.30
Calcium acetate, bags	100 lb.	4.00 –	4.05
Calcium arsenate, dr.	lb.	.11 –	.11½
Calcium carbide, drums	lb.	.05 –	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½ –	.07
Camphor, cases	lb.	.78 –	.79
Carbon bisulphide, drums	lb.	.06 –	.06½
Carbon tetrachloride, drums	lb.	.08½ –	.09
Chalk, precip.—domestic, light, bbl.	lb.	.04½ –	.04½
Domestic, heavy, bbl.	lb.	.03½ –	.04
Imported, light, bbl.	lb.	.04½ –	.05
Chlorine, liquid, tanks, wks.	lb.	.04 –	.04½
Contract, tanks, wks.	lb.	.04 –	....
Cylinders, 100 lb., wks.	lb.	.05 –	.06
Cylinders, 100 lb., spot	lb.	.08½ –	.09
Chloroform, tech., drums	lb.	.30 –	.32
Cobalt, oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	16.00 –	18.00
Copper carbonate, bbl.	lb.	.17 –	.17½
Copper cyanide, drums	lb.	.45 –	.46
Coppersulphate, dom., bbl.	100 lb.	4.50 –	4.65
Imp bbl.	100 lb.	4.37½ –	4.50
Cream of tartar, bbl.	lb.	.22½ –	.23
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	1.05 –	1.10
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 –	2.50
Ether, U.S.P., dr.	lb.	.13 –	.16
Ethyl acetate, 85%, drums	gal.	1.10 –	....
Ethyl acetate, 99%, dr.	gal.	$1.25 –	....
Formaldehyde, 40%, bbl.	lb.	.11 –	.11½
Fullers earth—f.o.b. mines	ton	18.00 –	20.00
Furfural, works, bbl.	lb.	.25 –	....
Fusel oil, ref., drums	gal.	3.50 –	....
Fusel oil, crude, drums	gal.	2.50 –	3.00
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.95 –	1.05
Glycerine, c.p., drums extra	lb.	.16½ –	.17
Glycerine, dynamite, drums	lb.	.15 –	....
Glycerine, crude 80%, loose	lb.	.10½ –	....
Hexamethylene, drums	lb.	.70 –	.75
Lead:			
White, basic carbonate, dry, casks	lb.	.09¾ –	....
White, basic sulphate, casks	lb.	.09¼ –	....
White, in oil, kegs	lb.	.11½ –	....
Red, dry, casks	lb.	.11½ –	....
Red, in oil, kegs	lb.	.13 –	....
Lead acetate, white crys., bbl.	lb.	.14½ –	....
Brown, broken, casks	lb.	.13½ –	....
Lead arsenate, powd., bbl.	lb.	.18 –	.20
Lime-Hydrated, bg, wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.11 –	....
Lithopone, bags	lb.	.06½ –	.06¾
Magnesium carb., tech., bags	lb.	.08½ –	.08½
Methanol, 95%, bbl.	gal.	.93 –	....
Methanol, 97%, bbl.	gal.	.95 –	....
Methanol, pure, tanks	gal.	.90 –	....
drums	gal.	1.00 –	....
bbl.	gal.	1.05 –	....
Methyl-acetone, t'ks.	gal.	1.05 –	1.10
Nickel salt, double, bbl.	lb.	.10 –	.10½
Nickel salts, single, bbl.	lb.	.10½ –	.11
Orange mineral, csk.	lb.	.14½ –	.14¾
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.70 –	.75
Phosphorus, yellow, cases	lb.	.35 –	.40
Potassium bichromate, casks	lb.	.09¾ –	.09¾
Potassium bromide, gran., bbl.	lb.	.19 –	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½ –	.06¾
Potassium chlorate, powd.	lb.	.07½ –	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.08½ –	.08¾
Potassium hydroxide (caustic potash) drums	lb.	.06½ –	.06¾
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.07½ –	.09
Potassium permanganate, drums	lb.	.14 –	.14½
Potassium prussiate, red, casks	lb.	.45 –	.48
Potassium prussiate, yellow, casks	lb.	.20 –	.20½
Salammoniac, white, gran., casks, imported	lb.	.06½ –	.06¾
Salammoniac, white, gran., bbl., domestic	lb.	.07½ –	.07¾
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk) works	ton	21.00 –	....
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 –	....
bags, contract	100 lb.	1.38 –	....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 –	....
bags, contract	100 lb.	1.45 –	....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.50 –	3.85
Soda, caustic, solid, 76% f. a.s. N. Y.	100 lb.	3.00 –	....
Sodium acetate, works, bbl.	lb.	.05 –	.05½
Sodium bicarbonate, bulk, 330-lb. bbl.	100 lb.	1.75 –	....
	100 lb.	2.00 –	....
Sodium bichromate, casks	lb.	.07½ –	.07¾
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½ –	.04½
Sodium chlorate, kegs	lb.	.06½ –	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22
Sodium fluoride, bbl.	lb.	$0.09 –	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½ –	.02¾
Sodium nitrite, casks	lb.	.07½ –	.08
Sodium peroxide, powd., cases	lb.	.28 –	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½ –	.03¾
Sodium prussiate, yel. bbl.	lb.	.11½ –	.12
Sodium salicylic, drums	lb.	.40 –	.42
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03½ –	.03¾
Sodium sulphite, crys., bbl.	lb.	.03½ –	.03¾
Strontium nitrate, powd., bbl.	lb.	.10 –	.10½
Sulphur chloride, yel drums.	lb.	.04½ –	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08
Tin bichloride, bbl.	lb.	.14 –	.14½
Tin oxide, bbl.	lb.	.55 –	....
Tin crystals, bbl.	lb.	.35½ –	.36
Zinc carbonate, bags	lb.	.14 –	.14½
Zinc chloride, gran, bbl.	lb.	.05 –	.05½
Zinc cyanide, drums	lb.	.36½ –	.37
Zinc dust, bbl	lb.	.08½ –	.08½
Zinc oxide, lead free, bag	lb.	.07½ –	....
5% lead sulphate, bags	lb.	.07½ –	....
10 to 35 % lead sulphate, bags	lb.	.07 –	....
French, red seal, bags	lb.	.09½ –	....
French, green seal, bags	lb.	.10½ –	....
French, white seal, bbl.	lb.	.12 –	....
Zinc sulphate, bbl.	100 lb.	2.75 –	3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.65
Alpha-naphthol, ref., bbl.	lb.	.65 –	.80
Alpha-naphthylamine, bbl.	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salts, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.75 –	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.68 –	.72
Anthraquinone, 25%, paste, drums	lb.	.75 –	.80
Benzaldehyde U.S.P., carboys	lb.	1.50 –	....
f.f.c. drums	lb.	1.60 –	....
tech, drums	lb.	70	....
Benzene, pure, water-white, tanks, works	gal.	.25 –	....
Benzene, 90%, tanks, works	gal.	.23 –	....
Benzidine base, bbl.	lb.	.80 –	.84
Benzidine sulphate, bbl.	lb.	.72 –	.75
Benzoic acid, U.S.P., kegs	lb.	.83 –	.86
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	.70
Benzyl chloride, 95-97%, ref., carboys	lb.	.40 –	....
Benzyl chloride, tech., drums	lb.	.25 –	....
Beta-naphthol, tech., bbl.	lb.	.24 –	.25
Beta-naphthylamine, tech.	lb.	.75 –	.80
Cresol, U.S.P., drums	lb.	.25 –	.29
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.70 –	.73
95-97%, drums, works	gal.	.65 –	.68
Dichlorbenzene, drums	lb.	.06 –	.08
Diethylaniline, drums	lb.	.53 –	.55
Dimethylaniline, drums	lb.	.38 –	.39
Dinitrobenzene, bbl.	lb.	.18 –	.20
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.20 –	.22
Dip oil, 25%, drums	gal.	.30 –	.35
Diphenylamine, bbl.	lb.	.50 –	.52
H-acid, bbl.	lb.	.70 –	.75
Meta-phenylenediamine, bbl.	lb.	.95 –	1.00
Michlers ketone, bbl.	lb.	3.00 –	3.50
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	.95 –	1.10
Naphthalene, flake, bbl.	lb.	.06 –	.06½
Naphthalene, balls, bbl.	lb.	.07 –	.07½
Naphthionate of soda, bbl.	lb.	.60 –	.65
Naphthionic acid, crude, bbl.	lb.	.55 –	.60
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl.	lb.	.30 –	.35
Nitro-toluene, drums	lb.	.13½ –	.14
N-W acid, bbl.	lb.	1.05 –	1.10
Ortho-amidophenol, kegs	lb.	2.30 –	2.35
Ortho-dichlorbenzene, drums	lb.	.15 –	.17
Ortho-nitrophenol, bbl.	lb.	1.20 –	1.30
Ortho-nitrotoluene, drums	lb.	.11 –	.12
Ortho-toluidine, bbl.	lb.	.13 –	.14
Para-amifnophenol, base, kegs	lb.	1.30 –	....
Para-amifnophenol, HCl, kegs	lb.	1.55 –	....
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitraniline, bbl.	lb.	.68 –	.70
Para-nitrotoluene, bbl.	lb.	.58 –	.60
Para-phenylenediamine, bbl.	lb.	1.45 –	1.50
Para-toluidine, bbl	lb.	.88 –	.90
Phthalic anhydride, bbl.	lb.	.30 –	.34
Phenol, U.S.P., dr.	lb.	.28 –	.36½
Picric acid, bbl.	lb.	.20 –	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	3.50 –	....
Resorcinol, tech., kegs	lb.	1.40 –	1.50

Resorcinol, pure, kegs	lb.	$2.15 –	....
R-salt, bbl.	lb.	.55 –	.60
Salicylic acid, tech., bbl.	lb.	.33 –	....
Salicylic acid, U.S.P., bbl.	lb.	.35 –	....
Solvent naphtha, water-white, tanks	gal.	.25 –	....
Crude, tanks	gal.	.22 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl.	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.26 –	....
Toluene, drums, works	gal.	.30 –	....
Xylidine, drums	lb.	.50 –	....
Xylene, pure, tanks	gal.	.40 –	....
Xylene, com., tanks	gal.	.28 –	....

Naval Stores

Rosin B-D, bbl.	280 lb.	$5.75 –	.....
Rosin E-I, bbl.	280 lb.	5.80 –	.....
Rosin K-N, bbl.	280 lb.	6.10 –	$6.80
Rosin W.G.-W.W., bbl.	280 lb.	7.65 –	7.85
Wood rosin, bbl.	280 lb.	5.80 –	5.90
Turpentine, spirits of, bbl.	gal.	1.03 –	1.04
Wood, steam dist., bbl.	gal.	.88 –	.....
Wood, dest. dist., bbl.	gal.	.70 –	.....
Pine tar pitch, bbl.	200 lb.	5.50 –	.....
Tar, kiln burned, bbl.	500 lb.	11.00 –	.....
Retort tar, bbl.	500 lb.	11.00 –	.....
Rosin oil, first run, bbl.	gal.	.43 –	.....
Rosin oil, second run, bbl.	gal.	.47 –	.....
Rosin oil, third run, bbl.	gal.	.50 –	.....
Pine oil, steam dist.	gal.	.60 –	.62
Pine oil, pure, dest. dist.	gal.	.55 –	.....
Pine tar oil, ref.	gal.	.35 –	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.30 –	.....
Pine tar oil, double ref., bbl.	gal.	.70 –	....
Pinewood creosote, ref., bbl.	gal.	..... –	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.03½ –	$0.05½
Grease, yellow, loose	lb.	.06½ –	.....
Lard oil, Extra No. 1, bbl.	gal.	.85 –	.....
Neatsfootoil 20 deg. bbl.	gal.	1.33 –	.....
No. 1, bbl.	gal.	.88 –	.92
Oleo Stearine		.09½ –	.....
Oleo oil, No. 1, bbl.	lb.	.14½ –	.....
Red oil, distilled, d.p. bbl.	lb.	.08½ –	.08¾
Saponified, bbl.	lb.	.08½ –	.08¾
Tallow, extra, loose	lb.	.08¼ –	.....
Tallow oil, acidless, bbl.	gal.	.86 –	.....

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.15 –	.....
Castor oil, No. 1, bbl.	lb.	.15½ –	.....
Chinawood oil, bbl.	lb.	.19 –	.19½
Coconut oil, Ceylon, bbl.	lb.	.09½ –	.10
Ceylon, tanks, N.Y.	lb.	.08½ –	.....
Coconut oil, Cochin, bbl.	lb.	.10½ –	.10½
Corn oil, crude, bbl.	lb.	.12 –	.....
Crude, tanks, (f.o.b. mill)	lb.	.09½ –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.08¼ –	.....
Summer yellow, bbl.	lb.	.10½ –	.10¾
Winter yellow, bbl.	lb.	.12 –	.12½
Linseed oil, raw, car lots, bbl.	gal.	.94 –	.....
Raw, tank cars (dom.)	gal.	.88 –	.....
Boiled, cars, bbl. (dom.)	gal.	.96 –	.....
Olive oil, denatured, bbl.	gal.	1.20 –	1.30
Sulphur, (foots) bbl.	lb.	.10½ –	.....
Palm, Lagos, casks	lb.	.07½ –	.....
Niger, casks	lb.	.06½ –	.07
Palm kernel, bbl.	lb.	.09½ –	....
Peanut oil, crude, tanks (mill)	lb.	.12½ –	.....
Peanut oil, refined, bbl.	lb.	.14½ –	.15½
Perilla, bbl.	lb.	.15½ –	.15¾
Rapeseed oil, refined, bbl.	gal.	.87 –	.....
Sesame, bbl.	lb.	.11½ –	.12
Soya bean (Manchurian), bbl.	lb.	.12 –	....
Tank, f.o.b. Pacific coast	lb.	.10 –	.....
Tank, (f.o.b. N.Y.)	lb.	.10½ –	.....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.65 –	$0.67
Menhaden, light pressed, bbl.	gal.	.62 –	.....
White bleached, bbl.	gal.	.64 –	.....
Blown, bbl.	gal.	.68 –	.....
Crude, tanks (f.o.b. factory)	gal.	.47½ –	.....
Whale No. 1 crude, tanks, coast	lb.	..... –	.....
Winter, natural, bbl.	gal.	.75 –	.76
Winter, bleached, bbl.	gal.	.78 –	.79

Oil Cake and Meal

Coconut cake, bags	ton	$33.00 –	....
Cottonseed meal, f.o.b. mills	ton	44.00 –	....
Linseed cake, bags	ton	41.00 –	....
Linseed meal, bags	ton	43.00 –	....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.50 –	$0.55
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochneal, bags	lb.	.32 –	.34
Cutch, Borneo, bales	lb.	.04½ –	.04¾
Cutch, Rangoon, bales	lb.	.14 –	.15
Dextrine, corn, bags	100 lb.	3.64 –	3.69
Dextrine, gum, bags	100 lb.	3.99 –	4.09
Divi-divi, bags	ton	39.00 –	40.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Gambier com., bags	lb.	.11½ –	.11¾
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	90.00 –	.....
Sumac, ground, bags	ton	$85.00 –	$90.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags	100 lb.	3.02 –	3.12
Tapioca flour, bags	lb.	.06 –	.07

Extracts

Archil, conc., bbl.	lb.	$0.16½ –	$0.20
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.09½ –	.09¾
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	.14 –	.15
Logwood, liq., 51°, bbl.	lb.	.08 –	.09
Quebracho, solid, 65% tannin, bbl.	lb.	.05 –	.05½
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.06½ –	$0.08½
spot, cases	lb.	.10 –	.14
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.40 –	.43
Prussian, bbl.	lb.	.40 –	.43
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P.Light, bbl.	lb.	.28 –	.30
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.26 –	.28
Reds Carmine No. 40, tins	lb.	4.50 –	4.70
Iron oxide red, casks	lb.	.10 –	.16
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.15 –	1.20
Yellow, Chrome, C.P. bbls.	lb.	.17 –	.17½
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.25 –	$0.26
Beeswax, crude, Afr. bg.	lb.	.22 –	.22½
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.23 –	.23½
Carnauba, No. 1, bags	lb.	.36 –	.38
No. 2, North Country, bags	lb.	.21 –	.21½
No. 3, North Country, bags	lb.	.18½ –	.19
Japan, cases	lb.	.19½ –	.20
Montan, crude, bags	lb.	.05½ –	.06
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04¾ –	.05
Crude, scale 124-126 m.p. bags	lb.	.04¾ –	.04¾
Ref., 118-120 m.p., bags	lb.	.04¾ –	....
Ref., 123-125 m.p., bags	lb.	.05 –	....
Ref. 128-130 m.p., bags	lb.	.05½ –	....
Ref., 133-135 m.p., bags	lb.	.05½ –	....
Ref., 135-137 m.p., bags	lb.	.05¾ –	....
Stearic acid, agle pressed, bags	lb.	.11¼ –	.11½
Double pressed, bags	lb.	.11¼ –	.12
Triple pressed, bags	lb.	.13 –	.13½

Fertilizers

Acid phosphate, 16%, bulk, works	ton	$8.00 –	$8.25
Ammonium sulphate, bulk f.o.b. works	100 lb.	2.90 –	.....
Blood, dried, bulk	unit	4.10 –	4.15
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	..... –	.....
Nitrate of soda, bags	100 lb.	2.45 –	.....
Tankage, high grade, f.o.b. Chicago	unit	3.30 –	3.40
Phosphate rock, f.o.b. mines			
Florida pebble, 68-72%	ton	4.00 –	4.50
Tennessee, 78-80%	ton	7.75 –	8.00
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	45.85 –	.....
Double manure salt	ton	27.00 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.20½ –	.....
Upriver coarse	lb.	.17½ –	.....
Upriver caucho ball	lb.	.19 –	.....
Plantation—First latex crepe	lb.	.25½ –	.....
Ribbed smoked sheets	lb.	.25¼ –	.....
Brown crepe, thin, clean	lb.	.24½ –	.....
Amber crepe No. 1	lb.	.25 –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.10 –	$0.15
East Indian, bold, bags	lb.	.20 –	.21
Manila, pale, bags	lb.	.19 –	.20
Pontinak, No. 1 bags	lb.	.19 –	.20
Damar, Batavia, cases	lb.	.23 –	.....
Singapore, No. 1, cases	lb.	.31 –	.32
Singapore, No. 2, cases	lb.	.21½ –	.22
Kauri, No. 1, cases	lb	.64 –	.66
Ordinary chips, cases	lb.	.20½ –	.21½
Manjak, Barbados, bags	lb.	.08 –	.11

Shellac

Shellac, orange fine, bags	lb.	$0.59 –	....
Orange superfine, bags	lb.	.61 –	....
A. C. garnet, bags	lb.	.56 –	....
Bleached, bonedry	lb.	.68 –	.69
Bleached, fresh	lb.	.56 –	....
T. N., bags	lb.	.56 –	.57

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$300.00 –	$400.00
Asbestos, shingle, f.o.b., Quebec	sh. ton	50.00 –	70.00
Asbestos, cement, f.o.b., Quebec	sh. ton	20.00 –	25.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	16.00 –	17.00
Barytes, grd., off-color, f.o.b. Balt.	net ton	13.00 –	14.00
Barytes, floated, f.o.b. St. Louis, bbl.	net ton	23.00 –	24.00
Barytes, crude f.o.b. mines, bulk	net ton	8.00 –	8.50
Casein, bbl., tech.	lb.	.12 –	.12½
China clay (kaolin) crude,			
No. 1, f.o.b. Ga.	net ton	7.00 –	8.00
Washed, f.o.b. Ga.	net ton	8.50 –	9.00
Powd., f.o.b. Ga.	net ton	13.00 –	20.00
Crude f.o.b. Va.	net ton	6.00 –	8.00
Ground, f.o.b. Va.	net ton	13.00 –	19.00
Imp., lump, bulk	net ton	15.00 –	20.00
Imp., powd.	net ton	45.00 –	50.00
Feldspar, No. 1 f.o.b. N.C.	long ton	6.50 –	7.00
No. 2 f.o.b. N.C.	long ton	4.50 –	5.00
No. 1 soap	long ton	7.00 –	.....
No. 1 Canadian, f.o.b. mill, powd.	long ton	20.00 –	.....
Graphite, Ceylon, lump, first quality, bbl.	lb.	.05½ –	.06
Ceylon, chip, bbl.	lb.	.04½ –	.05
High grade amorphous crude	ton	15.00 –	35.00
Gum arabic, amber, sorts, bags	lb.	.11 –	.11½
Gum tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.35 –	1.40
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N. Y.	ton	50.00 –	55.00
Magnesite, crude, f.o.b. Cal.	ton	14.00 –	15.00
Pumice stone, imp., casks	lb.	.03 –	.05½
Dom., lump, bbl.	lb.	.05 –	.05½
Dom., ground, bbl.	lb.	.05 –	.06
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.50
Silica, sand blast, f.o.b. Ind.	ton	2.25	3.50
Silica, amorphous, 200-mesh, f.o.b. Ill.	ton	20.00 –	.....
Silica, glass sand, f.o.b. Ill.	ton	1.75 –	3.00
Soapstone, coarse, f.o.b. Vt., bags	ton	7.50 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	9.50 –	.....
Talc, 200 mesh, f.o.b. Ga., bags	ton	8.50 –	9.00
Talc, 325 mesh, f.o.b. New York, grade A bags	ton	14.75 –	.....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$4.00 –	$4.50
Corning	bbl.	1.95 –	.....
Cabell	bbl.	2.05 –	.....
Somerset	bbl.	2.15 –	2.35
Illinois	bbl.	1.92 –	.....
Indiana	bbl.	1.93 –	.....
Kansas and Okla. under 30 deg.	bbl.	1.15 –	.....
California, 35 deg. and up	bbl.	1.40 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.20 –	.....
Naphtha, V. M. & P. dcod, steel bbls	gal	.19 –	.....
Kerosene, ref. tank wagon	gal.	.15 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.09 –	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.21½ –	.22
Bloomless, 30@31 grav.	gal.	.18 –	.....
Paraffin, pale	gal.	.17 –	.17½
Spindle, 200, pale	gal.	.21 –	.21½
Petrolatum, amber, bbls.	lb.	.03½ –	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–$145
Chrome brick, f.o.b. Eastern shipping points	ton	45–47
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	42–45
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	35–38
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	50–53
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	50–53
F.o.b. Mt. Union, Pa.	1,000	42–45
Silicon carbide refract. brick, 9-in.	1,000	1180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00 –	.....

Ferrochromium, per lb. of Cr, 1-2% C	lb.	$0 30	.....
4-6% C	lb.	.10½	.....
Ferromanganese, 78-82% Mn, Atlantic seabd duty paid	gr. ton	109.00	.....
Spiegeleisen, 19-21% Mn	gr. ton	38.00 -	40.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 -	2.50
Ferrosilicon, 10-12%	gr. ton	41.50 -	46.50
50%	gr. ton	75.00 -	80.00
Ferrotungsten, 70-80%, per lb. of W	lb.	.85 -	.90
Ferro-uranium, 35-50% o U per lb. of U	lb.	4.50	.....
Ferrovanadium, 30-40% per lb. of V	lb.	3.50 -	4.00

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 -	$8.75
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 -	23.00
C.i.f. Atlantic seaboard	ton	19.50 -	22.00
Coke, fdry., f.o.b. ovens	ton	5.25 -	5.75
Coke, furnace, f.o.b. ovens	ton	4.00 -	4.15
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50	.....
Ilmenite, 52% TiO_2 Va	lb.	.01½	.....
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.42 -	.46
Manganese ore, chemica (MnO_2)	ton	75.00 -	80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y	lb.	.80	.....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 -	.08
Pyrites, Span., fines, c.i.f Atl. seapor t	unit	.11½ -	.12
Pyrites, Span., furnace size c.i.f. Atl. seaport	unit	.11½ -	.12
Pyrites, dom. fines, f.o.b. mines, Ga	unit	.12	.....
Rutile, 95% TiO_2	lb.	.12 -	.15
Tungsten, scheelite, 60% WO_3 and over	unit	9.50 -	10.00
Tungsten, wolframite, 60% WO_3	unit	8.50 -	9.00
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 -	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 -	2.50
Vanadium pent oxide, 99%	lb.	2.00 -	14.00
Vanadium ore, per lb. V_2O_5	lb.	1 00 -	1.25
Zircon, 99%	lb.	.06 -	.06¾

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.13 -$0.13¾
Aluminum, 98 to 99%	lb.	.27½ - .28½
Antimony, wholesale, Chinese and Japanese	lb.	.11 - .11½
Nickel, 99%	lb.	.26 - .30
Monel metal, shot and blocks	lb.	.32
Tin, 5-ton lots, Straits	lb.	.54¼
Lead, New York, spot	lb.	.08½
Lead, E. St. Louis, spot	lb.	.09
Zinc, spot, New York	lb.	.0725
Zinc, spot, E. St. Louis	lb.	.0690
Silver (commercial)	oz.	.64
Cadmium	lb.	.70- .75
Bismuth (500 lb. lots)	lb.	2.35
Cobalt	lb.	2.50-3 00
Magnesium, ingots, 99%	lb.	.90-.95
Platinum	oz.	125.00
Iridium	oz.	275.00-300.00
Palladium	oz.	83.00
Mercury	75 lb.	59.00-60.00
Tungsten	lb.	.95-1.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	29.50
Copper bottoms	29.50
Copper rods	20 00
High brass wire	18.00
High brass rods	15.50
Low brass wire	20.00
Low brass rods	20.50
Brazed brass tubing	23.50
Brazed bronze tubing	25.00
Seamless copper tubing	23.50
Seamless high brass tubing	22.00

OLD METALS—The following are the dealers purchasing prices in cents per pound:

Copper, heavy and crucible	10.00 @ 10.25
Copper, heavy and wire	9.87½ @ 10.00
Copper, light and bottoms	8.00 @ 8.25
Lead, heavy	6.62½ @ 6.87½
Lead, tea	3.62½ @ 3.87½
Brass, heavy	5.25 @ 5.50
Brass, light	4.50 @ 4.75
No. 1 yellow brass turnings	5 00 @ 5.12½
Zinc scrap	3 75 @ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.54	$3.54
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

ANNISTON—The Central Foundry Co. has preliminary plans for rebuilding the portion of its local foundry, used for iron casting production, destroyed by fire, Feb. 7, with loss estimated at $100,000, including equipment. The new structure will cost approximately a like amount.

California

FULLERTON—The new local plant of the Western Glass Co., for which building contract recently has been awarded, will be devoted to the production of rolled glass products, supplementing the main works of the company located at Streator, Ill. It will consist of a number of buildings, including polishing and cutting shop, 200x200 ft., saw-tooth type; a lehr building for drying and cooling service, 40x170 ft.; casting shop, 80x140 ft.; furnace building, 80x82 ft.; tank building, 42x80 ft.; machine shop, 40x80 ft.; warehouse, 40x80 ft.; and administration building, 60x65 ft., all 1-story. The plant will be situated in the Bastanchury industrial section, and will cost close to $500,000, with machinery, instead of a lesser sum, previously noted. Work will be placed under way at once.

SAN FRANCISCO—The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until March 4 for 25,000 lb. kapok fiber, as specified in Schedule 1907, for the Mare Island Navy Yard. Also, at the same time, for 31,000 gal. of alcohol for the San Diego, Calif., yard.

SAN BERNARDINO—The Southern California Gas Co. is planning extensions in its artificial gas plants in this section. It is proposed to construct a new 3,000,000-cu.ft. container and auxiliary structures in the Colton district to cost approximately $275,000. H. C. McAllister is general manager.

Connecticut

WATERBURY—The American Crystal Co., manufacturer of watch crystals, etc., has plans under way for the erection of a 1-story plant addition on South Main St., 90x185 ft. Thomas M. Freney, Waterbury, is architect.

Florida

BARTOW—The Shearman Concrete Pipe Co., Knoxville, Tenn., is planning construction of a branch plant on local site, for the manufacture of its regular line of pipe.

AVON PARK—The Keebler Cement Products Co., Knoxville, Tenn., has plans under consideration for the construction of a new local plant for the manufacture of cement roofing tile, shingles and affiliated products. It is estimated to cost $30,000, with equipment.

Georgia

CHICKAMAUGA—The Crystal Springs Bleachery Co. is desirous of getting in touch with manufacturers of machinery for the production of paper bags, etc., with view to purchase of equipment for installation in a local plant.

Illinois

BELVIDERE—The Chicago Grain Products Co., 1602 South Main St., Rockford, Ill., has completed plans and will take bids at once for the erection of a new local alcohol-distilling plant, to be equipped for an initial capacity of 100 bbl. per day. It is estimated to cost approximately $100,000, with machinery. Charles W. Bradley & Sons, Brown Bldg., Rockford, are architects.

Indiana

HAMMOND—The Paige & Jones Chemical Co., 248 Fulton St., New York, manufacturer of water-treating compounds, etc., has completed an addition to its local plant, and will commence installation of equipment at once. The structure will provide for large increase in output.

MARION—The Elam Paper Co. has abandoned plans for its proposed new plant at Dayton, O., and will retain its present mill in this city. Arrangements are being made for the removal from Nebraska and 3rd Sts. to a larger building at Nebraska and 2nd Sts., where facilities for larger capacity will be provided. S. L. Elam is president and general manager, and W. H. Willy secretary.

NOBLESVILLE—The Burdick Tire & Rubber Co. has arranged for the resumption of operations at its local mill, following a curtailment for about a year past. Plans are under way for the installation of additional equipment in a number of departments for larger output and greater efficiency.

Kansas

COFFEYVILLE—The Common Council has plans under consideration for the construction of a municipal gas plant, 2-story, estimated to cost close to $500,000, including equipment. It is said that a site has been selected. D. Marshall is city engineer.

Kentucky

ASHLAND—The Ashland Refining Co., recently organized with a capital of $500,000, has preliminary plans under way for the erection of a new local oil refining plant, estimated to cost close to $250,000, with machinery. Paul G. Blaze and Thomas A. Coombs, both of Lexington, Ky., head the company.

Louisiana

SHREVEPORT—The Houseman Roofing Co., Inc., 1521 Pierre Ave., has plans for the construction of a new plant on local site for the manufacture of special water-seal concrete roofing tile, and kindred products. Work will soon be commenced.

NEW ORLEANS—The Victory Oil Co. is planning to rebuild the portion of its local oil-storage and distributing plant, recently destroyed by fire with loss estimated at close to $60,000, including equipment.

Massachusetts

WATERTOWN—The Hood Rubber Co., manufacturer of automobile tires and other rubber products, has plans under advisement for enlargements in its plant for increased output, including improvements in existing buildings and equipment. The company is arranging for a preferred stock issue of $1,600,000, a portion of the fund to be used for the expansion.

HOLYOKE—The Perfect Safety Paper Co. has construction in progress on a new addition for general manufacture, and plans to have the unit ready for service at an early date. J. B. Weiss is president.

HANOVER—Fire, Feb. 14, destroyed a portion of the plant of the Clapp Rubber Co., Hanover Four Corners, Hanover, including receiving, shipping and adjoining departments, with loss estimated at $250,000, including equipment. It is planned to rebuild. Headquarters of the company are at 49 Federal St., Boston.

Missouri

LEXINGTON—The Missouri Gas & Electric Service Co., Lexington, has authorized the construction of a new local water-gas manufacturing plant. A similar plant will also be built at Marshall, Mo., both to be of latest perfected type.

New Jersey

KEASBEY—The National Fireproofing Co., Fulton Bldg., Pittsburgh, Pa., has awarded a contract to the Belmont Iron Works, Philadelphia, for the erection of three buildings for its new local plant, to replace the works destroyed by fire several months ago, with loss in excess of $200,000, with equipment. Work will begin at once. Equipment will be installed for the manufacture of hollow tile and other fireproofing shapes.

WEEHAWKEN—Fire, Feb. 12, destroyed a portion of the plant of the Kuhne Chemical Co., Hackensack Ave. and 19th St., with loss estimated at $12,000. It is planned to rebuild.

New York

NEW YORK—The North Kensington Refinery, 214 East 22nd St., specializing in the production of brewery and similar sugars, has plans for extensions and improvements in its 4-story plant, estimated to cost approximately $100,000, including equipment. Morgan M. O'Brien, 49 East 19th St., is architect. Louis M. Haitog is president.

BROOKLYN—Flohr & Harris, 248 Lafayette St., manufacturers of oils, paints, etc., have purchased the 4-story factory buildings at 413-19 Kent Ave., at South 8th St., Brooklyn, 92x100 ft., for a new works. The structures heretofore have been used by the Combustion Utility Corp., which has removed to Toledo, Ohio.

BROOKLYN—The Standard Oil Co. of New York, 26 Broadway, has awarded a general contract to the H. D. Best Co., 949 Broadway, New York, for the construction of a 1-story laboratory, 60x120 ft., at its local plant, 394-404 Greenpoint Ave., to cost approximately $55,000, including equipment. Work will be commenced early in March.

North Dakota

RICHARDTON—The Lignite Coal & By-Products Co., Minneapolis, Minn., K. A. Loven, vice-president and general manager, has acquired property at Richardton with extensive lignite deposits, and plans construction of a new plant, with a number of byproducts units. The initial works will cost about $125,000, with equipment, and later additions will bring the investment to about $350,000. It is expected to break ground at an early date.

Oklahoma

CHICKASHA—The Oklahoma Eastern Oil Co. has work in progress on a new absorption plant on site about 4 miles from the city, and plans to equip the unit for early service.

Pennsylvania

PHILADELPHIA—The Publicker Commercial Alcohol Co., Swanson and Snyder Sts., will soon commence the erection of a new tank house at its plant.

PITTSBURGH—The Mississippi Glass Co., 220 5th Ave., New York, has acquired about 14 acres of land with buildings in Jefferson Township, heretofore held by the Pittsburgh Plate Glass Co., for a total consideration of $350,000, and will use the property in connection with production and operations in this section.

South Carolina

WESTMINSTER—C. J. Mulkey, Westminster, is planning for the operation of gold mines in this section, and will be interested in receiving information regarding machinery for this purpose.

Tennessee

CHATTANOOGA — The Tennessee Paper Mills, Inc., has plans for enlargements in its plant to increase the capacity from about 50 to 60 tons per day, particularly in the line of paper box stock. Work is in progress on a new steam-operated power plant, estimated to cost about $80,000.

SAINT ELMO (Chattanooga)—Fowler and Lewis, 5415 Beulah Ave., are perfecting plans for their proposed local oil-reclaiming mill, and will take bids for construction at an early date, awarding the contract in March. The installation will include a number of stills, with capacity from 100 to 300 bbl. each. The works will cost close to $60,000. T. E. Lewis is engineer.

Texas

GREENVILLE—The Board of Trustees, Buleson College, will soon have plans prepared for a new building at the institution, to include a number of laboratories for chemistry work.

PANHANDLE CITY—The Pauline Oil & Gas Co., Oklahoma City, Okla., has preliminary plans for the construction of a new local oil refinery. It is purposed to remove the present oil-refining plant in the Duncan oilfield to the new location, and install considerable additional equipment. The project includes the construction of a pipe line for crude oil supply for the refining unit.

GRAHAM—The Phillips Petroleum Co. has tentative plans for the construction of a new local gasoline-refining plant, with reported cost placed in excess of $75,000, including equipment.

Virginia

ALEXANDRIA—The Lamond Brick & Tile Co., Clarendon, Va., recently organized with a capital of $150,000, has plans for the construction of a new plant for the manufacture of burned clay tile and kindred products, on site selected on the Potomac River, about 1½ miles from Alexandria. It is estimated to cost close to $80,000, with equipment. C. C. Lamond, Clarendon, is president.

West Virginia

WHEELING—The Wheeling Steel Corp. has plans for the immediate erection of a new oxygen plant at its works at Portsmouth, O., to cost about $75,000. The structure will be used for developing commercial oxygen for welding service.

SOUTH CHARLESTON—The Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York, a subsidiary of the Union Carbide Co., has taken over the former local chlorine plant of the Barium Reduction Co., New York, recently leased, with option to purchase, and will use the works for the production of chlorine, caustic soda and affiliated products. Enlargements are said to be under consideration.

Wyoming

MILWAUKEE—Fire, Feb. 11, caused by the breaking of a glass retort in the chemical laboratory of the Andray-McMillan Co., 93 South Water St., manufacturer of oil products, destroyed a portion of the plant with loss estimated at $25,000, including equipment. It is planned to rebuild.

MILWAUKEE—The Milwaukee Gas Light Co., 182 Wisconsin St., is reported to be planning for the construction of a new artificial gas plant in the Menomonee Valley section, estimated to cost approximately $5,000,000, with manufacturing equipment and distributing facilities. R. B. Brown is general manager.

New Companies

LUSE-STEVENSON Co., 317 North Wells St., Chicago, Ill.; insulating materials, etc.; $50,000. Incorporators: Arthur Dixon, William Burry, Jr., and C. M. Peters.

CONNECTICUT ENAMEL & PAINT Co., Stamford, Conn.; paints, enamels, oils, etc.; $50,000. Incorporators: James McClery, W. N. Maguire and William H. Wiley, Stanwich Rd., Greenwich, Conn.

OIL MILL & FERTILIZER WORKS, INC., Henderson, Tex.; fertilizer products; $20,000. Incorporators: Homer Harris, Sr., and J. R. Alford, both of Henderson.

AMERICAN SOAP & CHEMICAL CO., INC., 38 West State St., Trenton, N. J.; chemicals, soaps, etc.; nominal capital $5,000. Raymond J. Gorman is company representative.

WITBECK CHEMICAL CORP., Albany, N. Y.; chemicals and chemical byproducts; 4,000 shares of stock, no par value. Incorporators: C. W. Twist, E. Rosenzweig and B. F. Witbeck. Representative: G. J. Hatt, 2d., attorney, Albany.

EDWARD J. MOELLER PAINT CO., INC., 1608 5th Ave., Moline, Ill.; paints, varnishes, etc.; $25,000. Incorporators: Edward J. and E. K. Moeller.

PECK'S BRASS FOUNDRY, INC., Bellingham, Wash.; brass and bronze castings; nominal capital, $5,000. Incorporators: Clarence B. Peck and Nathan Schuman Representative: Walter B. Whitcomb, Bellingham.

WESTERN PAPER & ENVELOPE CO., Long Beach, Calif.; paper products; $220,000. Incorporators: B. P. Boles, J. Q. Garwood and H. F. H. Schneider. Representative: Frank H. Jacques, 516-17 First National Bank Bldg., Long Beach.

IRCO LABORATORIES, INC., Camden, N. J., care of the Corporation Guarantee & Trust Co., 304 Market St., Camden, representative; chemicals and chemical byproducts; 500 shares of stock, no par value.

FOUR SEASONS FERTILIZER CO., New York, N. Y.; fertilizer products; $10,000. Incorporators: G. I. Banker, E. David and I. M. Herzig. Representative: Fritz Zeigler, Jr., 277 Broadway, New York.

L. A. MOORE & CO., INC., St. Paul, Minn.; paints, varnishes, etc.; $50,000. C. L. Moore, 875 St. Claire Ave., St. Paul, is the principal incorporator.

HENSEL DRUG & CHEMICAL CO., 2830 West Lake St., Chicago, Ill.; chemicals and byproducts, drugs, etc.; $100,000. Incorporators: Charles C. Kirk, Harvey T. Fletcher and Herbert A. Grotefeld.

POQUONOCK PAPER CO., Windsor, Conn.; pulp and paper products; $300,000. Incorporators: William S. Kenyon, Vincent W. Dennis and Donald C. McCarthy, 750 Main St., Hartford, Conn.

ALKYL PRODUCTS CO., care of the Corporation Trust Co. of America, du Pont Bldg., Wilmington, Del., representative; chemical compounds; $100,000.

PHILADELPHIA POTTERY CO., Camden, N. J.; pottery and kindred ceramic products; $125,000. Incorporators: G. W. Shannon, Percy L. Balentine and William R. Thomson. Representative: S. Stanger Iszard, 314 Market St., Camden.

WHERRITT-BRUHL CARBON CO., New York, N. Y.; carbon products; 300 shares of stock, no par value. Incorporators: M. Wherritt, H. S. Young and G. Bruhl. Representative: C. T. Lark, 527 5th Ave., New York.

TOPSALL MFG. CO., INC., New Haven, Conn.; liquid refinishes, etc.; $50,000. Incorporators: Bernhard Marcus, Jr., Fred W. Crosby and C. S. Reynolds, 45 Atlantic St., New Haven.

HAVILAND CLAY WORKS CO., Haviland, O.; burned clay products; $50,000. Incorporators: James Godshalk, Clarence and Clark E. Mumma, all of Haviland.

UNIVERSAL RUBBER PRODUCTS CO., 542 South Dearborn St., Chicago, Ill.; rubber goods; $15,000. Incorporators: Bruce Harrington, A. W. Boyle and J. H. Brown.

CONCENTRATED CHEMICAL CO., Philadelphia, Pa., care of the Corporation Guarantee & Trust Co., Land Title Bldg., Philadelphia, representative; chemicals and chemical compounds; $150,000.

BEANEY RUBBER CORP., Poughkeepsie, N. Y.; rubber products; $75,000. Incorporators: W. Beaney and R. H. Styles. Representatives: J. E. Ankus, 35 Park Ave., New York.

UNION HYDRAULIC PLASTER CO., Pittsburgh, Pa., being organized, to make application for state charter on March 3; plaster and kindred products. Incorporators: J. H. Toupet, R. W. Allison and Robert L. Taylor. Representative: Maurice Chaitkin, 415-19 Bakewell Bldg., Pittsburgh.

AURAMINE CORP. OF AMERICA, INC., New York, N. Y.; chemicals, dyes, etc.; $125,000. Adolf Franken, 116 West 32nd St., New York, is the principal incorporator.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CHEMICALS. Copenhagen, Denmark. Agency.—9181.

CHEMICALS. Stockholm, Sweden. Agency. 9202.

SODA, CYANIDE OF. Mexico City, Mexico. Agency.—9187.

TAR and tar substitute. Johannesburg, South Africa. Exclusive agency.—9168.

COTTONSEED for oil making. Marseilles, France. Agency.—9196.

LARD AND OLEO OIL. Copenhagen, Denmark. Agency.—9181.

OILCAKE. Paris, France. Agency.—9195.